Electrical Contracting

THE MAGAZINE OF ELECTRICAL CONSTRUCTION





You can get superior performance with G-E TULAMP ballasts

... savings, too

BECAUSE they greatly reduce the stroboscopic effect (flicker) of fluorescent lamps, G-E Tulamp ballasts materially improve the performance of fluorescent-lighting installations. And, because all Tulamp ballasts provide high power factor-95 per cent or above-you get savings in installation cost and operating costs, in comparison with uncorrected-power-factor installations.

- 1. Wiring costs are less, because almost twice as many lamps can be supplied from the same sized feeder. This means conservation of copper, too.
- 2. Ballast electrical losses are reduced materially, which means savings in operating costs.

A G-E Tulamp ballast costs less than two high-powerfactor single-lamp ballasts and only slightly more than two uncorrected-power-factor ballasts. Because of their performance and economy, G-E Tulamp ballasts are by far the most widely used ballasts for industrial and commercial applications. It will pay you to specify them for your installations.

Valuable information on ballast installation and operation, together with a complete listing of G-E ballasts for all applications, is included in our bulletin, GEA-3293C, "Ballasts for MAZDA F Lamps." Ask your retail or wholesale supply house for a copy or write direct to General Electric Company, Schenectady, New York.





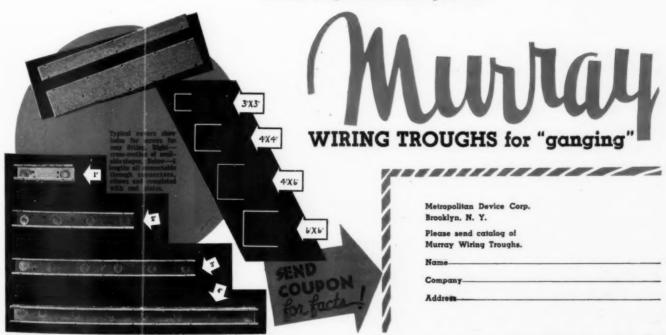
GENERAL & ELECTRIC



TROUGHS by Muriay

that keep
the
TOUGHEST
"GANGS"
in line

No matter how complicated, how long or how many turns (ever-ready elbows do the trick), Murray Wiring Troughs are easy and quick to install. They are strong and rigid when in place, yet easy to get into, through instantly removable covers. Tap for a branch anywhere—always a knockout handy. Four lengths—and four depth-width combinations. The installations above are typical—and the first you put in will look just as shipshape and prove the easiest job you can remember. Metropolitan Device Corporation, Brooklyn, N. Y.



ELECTRICAL CONTRACTING. Published monthly, price 25 cents a copy, Vol. 41, No. 5. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. Subscription Rates—U. S. A., and Latin-American Republics, \$2.00 a year, \$3.00 for two years, \$4.00 for three years. Canada \$2.50 a year, \$4.00 for two years, \$5.00 for three years. Great British Possessions 18 shillings for one year, 36 shillings for three years. All other countries \$3.00 a year; \$6.00 for three years. Entered as second-class matter August 29, 1936, at Post Office at Albany, N. Y., under the act of March 3, 1879. Printed in U. S. Copyright 1942 by McGraw-Hill Publishnig Company, Cable address: "McGrawhill, New York," Member A. B. P. Member A. B. C.

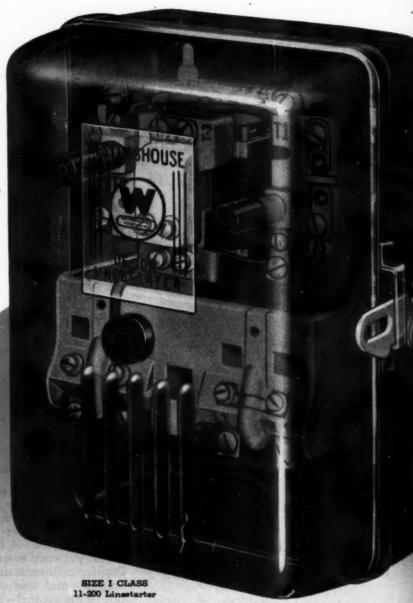


WITH WESTINGHOUSE "De-ion" LINESTARTERS

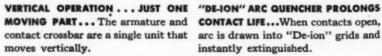
There's no "maybe" about the operation of the Westinghouse "De-ion" Linestarter. Simple, direct, vertical operation with just ONE moving part insures that the motor it controls will definitely "start" or "stop" without question or hesitation. Freedom from bearings and complicated linkages insures positive action. Vertical operation, as well, prevents the possibility of shocks causing accidental closing of the starter.

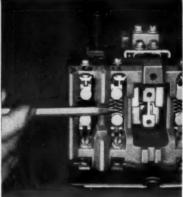
This basic feature, together with exclusive "De-ion" arc quenching protection for contacts, explains why Westinghouse Linestarters offer better protection against production interruptions on important circuits. Accurate, unvarying Bi-metal overload protection means further assurance for vital drives. Get these advantages today - check your nearest Westinghouse Agent.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.









MOVING PART... The armature and CONTACT LIFE... When contacts open, contact crossbar are a single unit that arc is drawn into "De-ion" grids and instantly extinguished.

Westinghouse

BI-METAL PROTECTION ...

added protection for vital motors



Motor protection that operates when it mesn't need to, means unnecessary delays in production. Protection that is prevented from operating when it should, means even more expense in damaged motors or machines.

The BI-METAL disc relay—a Westing-house development—solves both problems. It acts with uncanny accuracy to permit temporary overloads, as when motors are started across the line, yet snaps the circuit open with rifle-bullet speed when dangerous overloads occur. Factory-calibrated, it is always accurate and tamperproof. Automatic or self-resetting of relay after an overload cuts production time losses to a minimum.

BI-METAL is a basic protective feature of Westinghouse motor starters and circuit breakers—you get it at no extra cost. Use it for the added, accurate protection it affords—specify Westinghouse protective and control equipment. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

THESE "De-ion" LINESTARTERS MEET SPECIAL REQUIREMENTS







Motors and Control



OF IMAGINEERING

THESE NINE BOOKS are designed to help all men, everywhere, do the Imagineering that improves methods of production and speeds delivery to our fighting men of all war materiel made of aluminum.

HERE AT ALCOA, Imagineering has enabled us to double production and to be well on the way to tripling it, in an amazingly short time. And still the expansion goes on. Swinging immense new plants into top volume at top speed;



building again, and manning that new capacity efficiently
... This is Imagineering at work for the war.

WE'RE BREAKING RECORDS by sheer determination backed by know-how.

YOU'RE DOING THE SAME. Perhaps your men, many of them new to the ways of working with aluminum, can help you get even more speed through the know-how these books contain.

IN THE DAYS when we made only a driblet of Alcoa Aluminum Alloys, compared to the great flood we are now pouring into the war effort, our engineers could counsel with you personally on fabricating procedures. Today many of these men have been brought back to our plants to join the drive for production. From these books you can get much of the know-how our men used to bring you personally.

OUT OF THESE PAGES, too, will come the exciting Imagineering of the future. Many of the products you will create to meet the new competition, as well as millions of jobs for our boys as they come home, will stem from that Imagineering.

Aluminum Company of America, 2197 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM



SO MUCH SO SOON



FLUORESCENT LIGHTING

UITAL WEAPONS

FOR THE ARMY THAT WORKS INDOORS!

NCLE SAM'S Victory Drive is being fought on land and sea over the face of the globe. In addition, a mighty important part of it is conducted right here at home—indoors—at lathes—in warehouses—in drafting rooms—in offices—yes, and in stores, too, where tense, brave women go for the soothing influence of a new hat or the makings of a substantial dinner.

The members of this indoor army are fighting with eyes and nerves—and they need the kind of weapons which will protect them against eye strain and nervous exhaustion—GUTH Fluorescent Lighting is daily proving its importance in the battle. Already, the biggest part of GUTH Lighting Equipment is produced for wartime purposes!



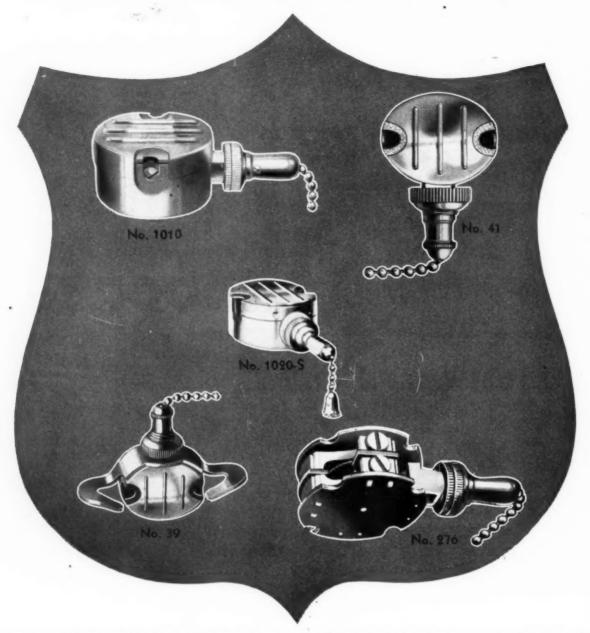
Office Efficiency Increased 15%

Here is a typical GUTH Fluorescent Installation in a typical American office (name on request). Of their new lighting, the company's president says, "Efficiency of office workers has increased 15%! and we are now receiving applications for work from the very best help in town, the strongest attraction being the comfortable working conditions."



THE EDWIN F. GUTH CO. • 2615 Washington Ave. • St. Louis, Mo.

MCGILL Sevolier Switches for All Fluorescent Lighting Jobs



The individual control of each lighting unit provided by McGILL Levolier Switches is a vital factor in the conservation of electric power, which is so important in our total war program. Another point to consider is the big saving in wire, conduit and labor for installation.

Defend your reputation and that of the Fluorescent Lighting manufacturer by installing

only the best in switches . . . Replacement of switches in Fluorescent installations is trouble-some and costly. McGILL switches have proven their dependability over a period of years and offer an enviable record for trouble-free operation in virtually every type of installation.

McGILL Levolier switches are recommended by many leaders in the Fluorescent field.

Levolier switches are available on priority orders.

MCGILL MANUFACTURING CO.

Electrical Division

VALPARAISO, INDIANA

New FLAMENO BUS-DROP CABLE NOT A SPECK OF RUBBER IN IT & NO CONDUIT EASY TO INSTALL. It simplifies making connection from

By use of this bus-drop cable, you'll be able to make connection from bus to machine quickly—at a saving in installation time and materials. It's easily installed, simply by use of squeeze-type fittings and porcelain hanger. If a machine is re-located, usually the same cable can readily be used in the new location. This cable saves vital materials because it has no rubber and requires no conduit. Saves rubber; saves steel.

NO PULLING-

Resists Oil, Resists Flame

It is better than rubber cable because it is highly resistant to oils and coolants. It will not support flame. Though not quite so flexible as rubber cable, it is easy to handle and easy to bend. And it has a lot of resistance to abrasion.

For safety to men and machines, this bus-drop cable has three ground wires, identified by green braid.

For quick identification, the conductors are insulated in red, white, and black.

plug-in bus to machine.

When ordering, specify SI-58179, length, and conductor size.

Flamenol Control Cable

For control circuits—any number of conductors—specify Flamenol control cable in which each conductor is identified by its own individual color.

When you consider new wiring or re-wiring, for jobs of 600 volts or below, specify Flamenol. The G-E

representative in your locality will help you select the right type. Or write to General Electric, Schenectady, N. Y.

General Electric and its employees are proud of the Nory award of Excellence made to its Erie Works for the manufacture of navel ordinance.

GENERAL E ELECTRIC



Your shoes and Ours

O you must have steel to do your part for Victory.

To take care of your needs, our plants are running day and night at capacity. Our men and women are AT WORK. We are busy producing our share of steel that America must have.

Is there enough steel for Victory? We say-Yes. We believe the nation's present difficulties with this critical material will be solved by cooperation between all users and producers, as partners for Victory.

When we at Youngstown look at your needs for steel, we try to put ourselves into your shoes; when you view the producer's problems, won't you try our shoes?

THE YOUNGSTOWN SHEET AND TUBE COMPANY YOUNGSTOWN, OHIO





STANDARD SWITCHGEAR equipments mean *more* and *better* switchgear for scores of plant engineers charged with equipping new and enlarged plants for wartime production.

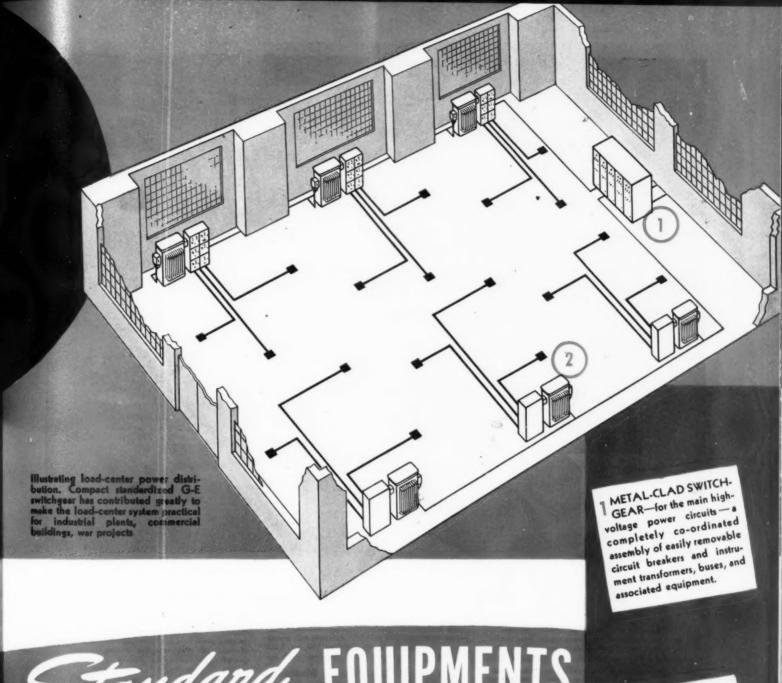
More — because our own war-geared factories are tooled to make standard switchgear in ever-increasing volume. This means you'll get standard switchgear sooner.

Better — because we've worked for years to standardize

the best equipments. We established a "one best" standard in every line—designed it for superior service over a wide range of applications. In recent years, industry ordered thousands of these "packaged" units to gain added safety, operating dependability and economy. Now the speedy production of switchgear, as well as quick installation, is so vital that standard switchgear is an absolute necessity. And we're ready, with standard equipments already developed and proved.



General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for



Standard EQUIPMENTS

Get Any or All of Your Plant Switchgear Equipments This Easy Better Way

TOW you can save precious days and weeks formerly spent over the drawing board and in drawn-out correspondence. Now you need only give us a simple oneline diagram showing the switchgear functions to be performed and the ratings.

You'll get our standard switchgear-the best, and the safest, we know how to build.

You can get everything you need in plant switchgear this quick, simple way. Every one of our standard equipments is designed for the broadest possible application. Our line of standard equipments is complete. Ask your nearest G-E office for additional information, or write the General Electric Company, Schenectady, N. Y.

2 LOAD-CENTER UNIT SUBSTATIONS-for distribution, control, and protection of low-voltage power up to 600 volts—a complete-

ly co-ordinated assembly of drawout-air-breaker switchgear equipments, transformers,

and high-voltage protective

devices.

EVERYTHING IN STA-TION SWITCHGEAR, TOO—Complete switchgear for the power station is described in our new bulletin, GEA-3742 — everythins from large FH cubicles right down to the metal-enclosed bus runs.

GENERAL ELECTRIC



MANY small and medium sized plants are being revamped for armament production. Revamping will require expansion of their electrical distribution systems for power and light.

While copper is scarce, rubber is scarcer—and the larger sizes of rubber-covered cable are increasingly hard to get.

Here's where **B** Busduct fits into the picture. It not only helps conserve the rubber that is so essential to our mobile defense units—it is the modern method of electrical distribution—flexible, economical and convenient.

Production hours are saved by the quick connection characteristics of Plugin (B) Busduct, which make it possible to move machines to any desired position — to plug in at once — and to start operation with a minimum loss of time.

Both Feeder and Plugin & Busduct may be installed with minimum labor cost, and may be taken down and moved to new locations without appreciable loss of material. Extensions may be made readily to existing installations, which need not be

Busduct is designed for 2, 3 and 4-wire feeder systems; 250 volt DC, 575 volt AC, maxi-mum. Plugin type capacities, 125 to 1,000 amperes; Feeder type, 250 amperes and up.

Investigate this Modern Method of Electric Distribution

Let the B Sales-Engineer show you how it may be applied to advantage — whether in new construction or plant modernization. His long experience will be helpful—and he will be glad to consult with you—without obligation. Write for his name and address.

Let Us Send You Bulletin 65

which gives full details of Busduct installa-tions, with photographs, diagrams and sug-gested specifications...Frank Adam Electric Co., St. Louis, Mo.

> This standard 10-foot section of Plugin Busduct shows the nine plug-in utlets, and, from left to right, B Shutlbrak Switch Plugin; (B) Klampswfuz Plugin (open) and (B) Klampswfuz (closed).

BETTER JOB

ELECTRICAL PRODUCTS

for Defense Industry

FRANK ADAM ELECTRIC CO.

Electrical Contracting

With which is consolidated The Electragist and Electrical Record . . . ESTABLISHED 1901

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A PRACTICAL PAPER for electrical contractors, industrial electricians, inspectors, engineers and motor shops, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction and maintenance.





Tops personally, he and his staff are the nemesis of all incoming materials that do not measure up to Anaconda quality standards: they check them all.

In these critical days, no one can afford to make mistakes, no matter how trifling, in

so vital a product as electrical wires and cables.

Relentless guard over the quality of products going into the manufac-

ture of Anaconda wires and cables, is this "bogey man." He and his group of expert associates check every item against Anaconda's rigid specifications (tougher by far than those stipulated by government agencies), to the end that every wire and cable bearing the Anaconda name can be

trusted for long, efficient, and eco-

nomical service.

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This familiar trade-mark symbolizes the best efforts of modern research and production.

ELECTRICAL WIRES AND CABLES OF COPPER ARE THE LIFE LINES OF OUR NATION

ANACONDA WIRE & CABLE COMPANY

Electrical Contracting

FOLLOW THE RULES

What about the relative usefulness of an A-10 rating against an A-3, for instance, in obtaining needed materials? For most business up to a short time ago any A rating produced the goods. Now the full impact of priorities control is becoming apparent.

With most of the raw materials which go into electrical construction products under strict allocation orders, which means simply that there is not enough for everyone, the higher priority ratings are today much more vital to get needed supplies within reasonable delivery schedules. Consequently, the priorities problem is more complicated. A product available within three weeks at A-6 a couple of months ago may need A-1-j or better today to get a three months delivery date. But this cautious regulation of scarce materials is the very essence of a successful war effort.

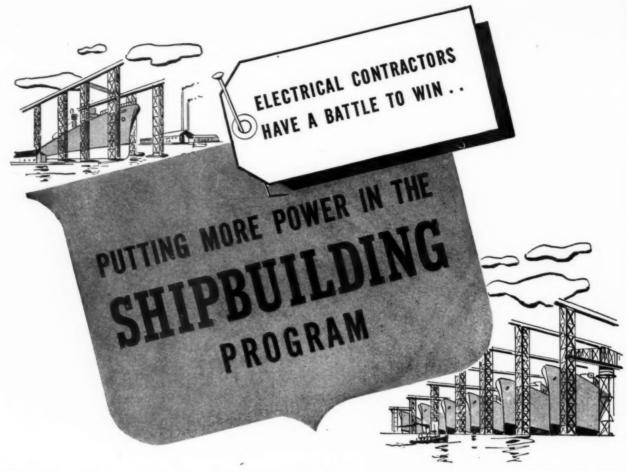
The electrical construction industry is using some of the highest priority ratings available because the work we are doing is of first rank importance. Whatever tightening is yet to come in allocations schedules, this industry will get job ratings high enough to obtain deliveries. Of this we can be certain.

But each change in the pattern yields further problems. Branch offices of WPB differ occasionally in interpretation. New forms are developed and new procedures established which take time to study and apply. But, like good soldiers, its our job to make our methods fit the rules. There are things that each buyer of electrical materials can do to simplify his own paper work and procedure. They can be done without making the job more complicated than it already is. Here they are.

First, he can set up an orderly system within his own office or department for handling priority purchases. Office personnel can be trained to treat the recording and extension of ratings as a part of essential office practice. Once the gears are meshed and running smoothly the actual paper work is routine. And good filing methods provide immediately accessible records of the priority rating of each job and the orders extended.

Second, he can work closely with his sources of supply to pass the essential ratings along to the manufacturers. A high rating indicates work of vital national importance that may not be apparent in the name of the project or the delivery address. It puts the order out in front of a long line of less essential requests and it is the only way the manufacturers can give preferred treatment today. The importance of cooperation and immediate extension of orders cannot be too strongly emphasized.

And, finally, he can bring an attitude of patience and tolerance into his relations with his sources of supply and government agencies. The long hours, the tremendous pressure of organizing industry for war aggravated by draft depleted staffs open the way for inevitable human errors. Most men are giving the best that's in them. We can't expect more. We can help, too, by knowing and sticking to the rules.



In a modern shippard, it's electricity that does most of the work: electric tools and shop equipment, electrically powered cranes and derricks, electric arc welding machines, electric floodlighting for 24-hour-a-day operation.

To get all our new shipyards going on time means busy days . . . and nights . . . for the electrical contractor who is ready to tackle an arduous job. Adequate power must be brought from substations and switchboards to each motor and machine. Many of the power and lighting circuits require protected outdoor construction, with runs of flexible cable to portable tools. In addition, a wiring network for alarm and communication is required.

Like any of the war jobs you're likely to be tackling today ... industrial conversion ... army camps ... air bases ... defense housing ... it calls for the best local aid you can get on equipment and supplies. And that's where you have a strong ally in GRAYBAR.

More than 200 manufacturers of the equipment frequently specified for these and other war jobs depend on GRAYBAR to speed their products to the point of need. Thanks to nationwide experience on such jobs, GRAYBAR has a good grasp of the problems of heavy construction. Thanks to a knowledge of your own needs and methods, your local GRAYBAR man can help you fulfill the contract on time and at a profit.

These Graybar-distributed products are widely used on Shipyard Jobs

Crouse-Hinds searchlights, floodlights and other special types of outdoor lighting. Also Benjamin outdoor lighting equipment and General Electric street lighting units. General Electric Mazda lamps.

BullDog BUStribution Duct and other modern wiring specialties and supplies. Harvey Hubbell industrial wiring devices. Simplex Tirex flexible cable. General Electric Motors and motor control, conduit, wiring devices, panel boards, circuit breakers, fuses and miscellaneous supplies.

Graybar Inter-phones, Webster Teletalk, Edwards Lokator and other signaling and alarm equipment.

GraybaR

IN OVER 80 PRINCIPAL CITIES

Executive Offices: GRAYBAR BUILDING, NEW YORK, N. Y.



Wiring for War

Mass production technique, modern wiring methods, engineered job control and close cooperation between engineers and contractors cut completion schedule nine months at the Buick Aviation Engine plant.



HE speed-up in war production that is so necessary to obtain victory in our war effort demands a speed-up in our defense plant construction. A revolutionary change in construction technique and methods is enabling Uncle Sam to bolster his production lines on the home front. One outstanding example of industry's answer to the production challenge is the aviation engine plant of the Buick Motor Division, General Motors Corporation; a production giant that arose seemingly overnight from a barren Illinois cornfield. Within nine months after the first shovelful of dirt was turned, the first assembled engine rolled off the production lines. Now this plant is justly proud of its record-nine months ahead of its production schedule; still rolling them out and gaining every day.

The story of this accomplishment is one of wholehearted cooperation of owner, architect, engineer, builder and subcontractors; of the application of advanced building design, construction methods; of a determined effort to produce an operating unit in the shortest possible time. The plans originated on the boards of Albert Kahn Associated

By August Eckel

Architects and Engineers, Inc., Detroit; the actual building construction was handled by Thorgersen and Ericksen, Chicago; the electrical work was engineered and installed by the Associated Electric Construction Company, a joint venture group formed by the Fries Walters Co., Harmon Electric Co., United Electrical Construction Co., and Kelso-Burnett Co., all of Chicago.

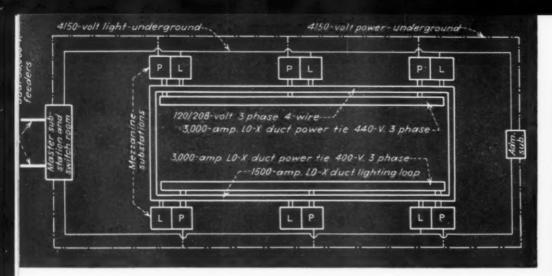
Electrical System Flexibility

Like all modern manufacturing plants, the heart of the production unit is the electrical system. Flexibility and protection against an emergency are the keynote of this design. Primary 33,000-volt power, from duplicate utility incoming lines, is transformed at a master substation to 4,150 volts for underground primary distribution to six mezzanine substations. Separate primary feeders for light and power are used. From these subs, secondary 440-volt, three-

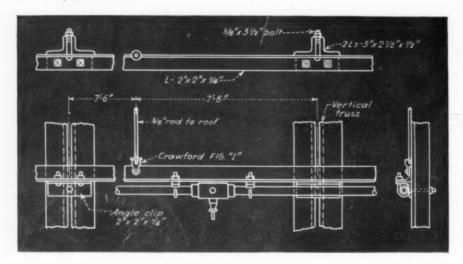
phase power is distributed to more than 8,000 motors and other electrical equipment over a network of some six miles of Bustribution bus ways, ranging in size from 3,000-amp, and 1,500-amp, low reactance duct to the conventional 250-amp, plug-in duct over the rows of machines. Spring-insulator supported flexible cable connect the machines to the distribution busway.

The lighting system is 120-208 volts, three-phase, 4-wire, with conduit feeders from the mezzanine subs terminating in pull boxes over narrow column type distribution panels. Branch circuits from some 8,000 fluorescent lighting units, each containing two 100-watt lamps, terminate in these pull boxes which contain the neutral bar. Only the hot circuit legs are run down to the panel circuit breakers.

Both the power and lighting systems are equipped with secondary emergency tie-lines to insure uninterrupted plant operation in case of a substation outage. The power tie consists of two parallel lines of 3,000 amp. LO-X feeder duct, each line interconnecting three of the mezzanine substations. The lighting tie consists of a closed secondary loop of



EMERGENCY LOOP and interconnections between the mezzanine substations assures uninterrupted plant operation in case of an outage. Both secondary tie lines are low reactance feeder bus ducts.



Clamps for Roof Purlin Mounting

250-A Duct
Hanger

3,000-A, 1500-A Duct Mounting

PRE-FABRICATED HANGERS and clamps were used to speed up installation time. Punching and drilling was eliminated wherever possible and electric welding used where feasible for mounting equipment.

ANGLE IRON SUPPORTS were used instead of messenger cable for the long rows of fluorescent fixtures over the production areas. The angle iron also served to support certain power duct runs and pipes of other trades.

1,500-amp. LO-X feeder duct connecting all six substations. Normally this loop is dead and is energized only during an emergency. In case of an outage at any substation, automatic interlocks feeding from the bus tie, take a balanced load from the other transformers and power can be fed in any direction.

Engineered Planning

The planning of the electrical construction work was engineered as carefully as the installation itself and paved the way for the utmost in mass production technique. Realizing that mass production construction technique depended upon having the right of way for mounting equipment, Engineer Strom of the Associated Electrical Construction Company, jumped the gun by submitting to the architects and engineers a detailed plan of busway and conduit runs, necessary clearances, dimensions, fixture mountings and equipment locations. With the right of way under his belt, he went to town and the other trades had to install their work accordingly. Delays, changes and arguments that commonly arise from "other trades" conflicts were entirely eliminated and the

installation progressed without a hitch. In the six miles of busway, involving numerous double offsets, crossovers, ties and other connections, only six unavoidable field cuts were necessary.

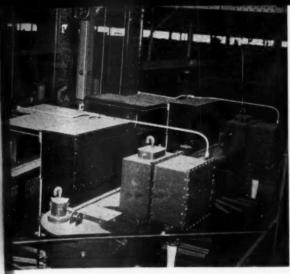
To assure that the proper equipment was in the right place at the right time, detailed fixture schedules, listing the type, size, number and location of each unit, were sent to the manufacturers. Each carton was coded at the manufacturers' plant so that, when delivered to the job, it immediately could be spotted in the proper location. Likewise detailed sketches of all prefabricated hangers, clamps, boxes, troughs, etc., were sent to the fabricators to eliminate onthe-job readjustments. All detailed sketches were multigraphed on standard 8½ by 11 paper and distributed to all foremen and mechanics interested in that particular phase of the work. Verbal orders and instructions were taboo. Everything was in writing so there would be no time lost due to misunderstandings and errors. Particular attention was paid to the numerous changes that arise on every construction job.

Specific methods of installing the lighting and power systems were developed with an eye to the elimination of all unnecessary labor and frequent backtracking.

Prefabricated saddle and trapeze duct hangers with field designed clamps and supports were used to eliminate all high bay drilling and punching. Electric welding was used wherever feasible. To give sufficient leeway for slight variations in floor levels and to eliminate lost time in fitting and cutting duct terminals, double offsets were used wherever bus duct entered or left substation switchboards. Messenger cable runs were used to support the flexible motor connections when they occurred between trusses.

Templates were used extensively to eliminate wasted time making typical measurements and were particularly handy in terminating multiple conduits at switchboards and mounting the panels, switches and motor controls.

The conventional messenger cable method of supporting the fluorescent units was discarded and a more rigid angle iron support substituted. Long rows of fixtures were mounted to the branch circuit conduit supported with J-bolts by pre-punched 2-in. by 2-in. by \frac{1}{2}-in. angle iron bolted to the roof trusses along the entire length of the building. The angle was rod supported from roof







NO LOST TIME on substation work. All connections from transformer to cubicle and from cubicles to feeders were made with pre-fabricated busway that fit together like a jig-saw puzzle.

DOUBLE OFFSETS in duct lines enter a mezzanine substation. The large flat busway is the low reactance emergency lighting duct interconnecting the substations. Other ducts are the power feeders.

LIGHTING PANELS of the narrow column type set flush in the web of the columns. Panels are mounted to channel brackets welded to column flanges. The wiring gutter extends to a pull box at the roof truss.

purlins at intermediate points and was mounted at such a height that it would also support the right angle 1,000-amp. feeder busway ties to the 250-amp. distribution duct. Other trades quickly took advantage of this rigid support and mounted their pipes and lines to it, thus speeding up their own installation work. The lighting units were connected to the branch circuit conduits by double-plug flexible jumper cords, one end of which plugged into a conduit fitting receptacle and the other into a flush receptacle built into the wiring channel.

The electrical installation proceeded with clockwork precision and very often exceeded estimated time schedules. The mass production technique employed centered around specialized crews, shop and field pre-fabrication, floor assembly into standard lengths, extensive use of power driven equipment, and the fact that the job was so organized that there was always a place for a crew to work if, for any unforeseen reason, they had to leave the work they were doing. Each crew was carefully chosen in accordance with the men's specific abilities; those familiar with high tension work were placed on the substations; those with control work experience were placed on control wiring, and so on.

All conduit was cut, threaded and assembled to specific dimensions in the field shop and distributed over to the job ready for installation. One crew did nothing but cut and thread the conduit, another did all the assembling; a third crew distributed it and a fourth crew installed it. Other make-up crews were delegated to various make-up tasks doing the same thing every day.

The installation crews rolled down the line on elevated scaffolds and elevator trucks, mounting the equipment that had been spotted along the line. These

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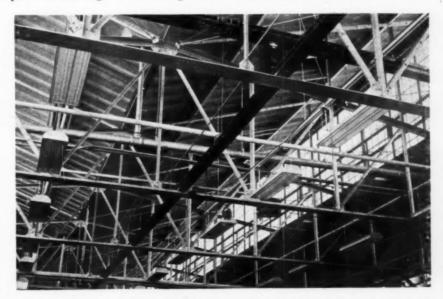
crews usually consisted of four men, two on the scaffold and two on the ground hoisting up the equipment. In the case of the power crew, the ground men operated an elevator truck to hoist the duct into place while the aerial crew mounted and connected it. There were several installation crews on each phase of the work, working simultaneously side by side, mounting several rows of power duct or lighting circuits.

Four installation crews handled the lighting; one mounted the supporting angle iron, a second installed the branch circuit conduit, a third pulled in the wires and connected the receptacles; and the fourth crew mounted and plugged in the fixtures. The ground men of the fixture crew employed two pulleys and ropes to hoist the five-foot fluorescent units. The aerial crew hooked the pulleys over the angle iron; the ground

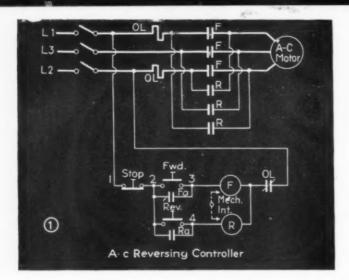
men fastened the units to the rope tongs and hoisted the units up for the scaffold crew to hook on to the conduit fixture hooks and plug in the jumpers. And so they proceeded from one line to the next.

The same assembly line technique was used throughout the job; on equipment brackets, mounting and connecting. One crew did nothing but connect motors throughout the plant. And so, from the start to the finish of the plant there was a succession of specialized crews acquiring an efficiency that led to plant completion months ahead of schedule.

The Associated Electrical Construction Company, which handled this project is one of the first "joint ventures" formed in the electrical construction industry to speed war work. The four contracting concerns pooled resources, tools and management facilities for an all out effort to beat the schedule.

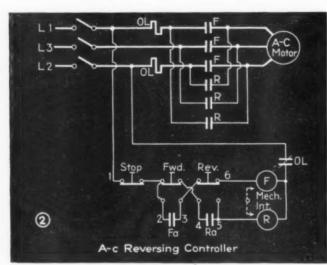


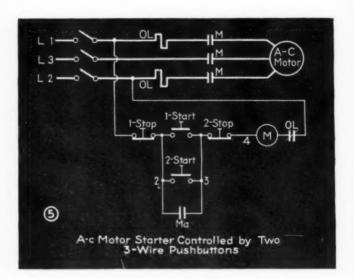
PLANT LIFELINES crisscross up in the trusses. A circuit breaker ties-in the 250-amp. distribution duct with the 1,000-amp, feeder duct resting on the angle iron supporting the lighting circuits. One support serves both power and lighting circuits.

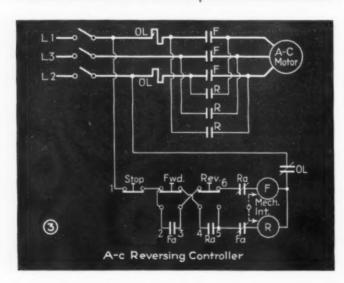


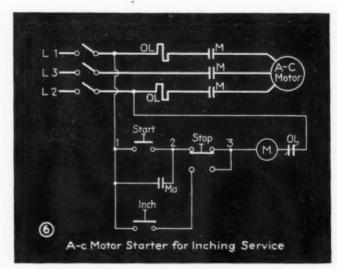
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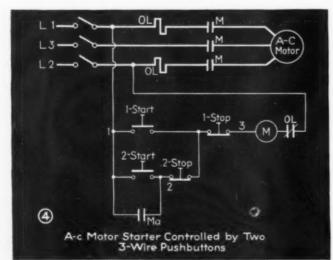
By R. B. IMMEL Control Engineer Westinghouse Electric & Manufacturing Co.

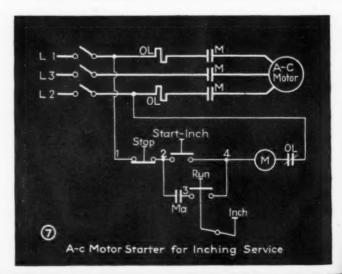












INTERLOCKING

Safety and trouble-free control operation are improved by circuit refinements and additional contact elements. The first of a series on control.

LECTRICAL and mechanical interlocking is usually applied to motor starters and controllers to provide safety for the operator and protection for the control elements, motor, and driven machine. The particular controller application should determine the degree or refinement of interlocking necessary. The safer design is usually more expensive than the simplest controller hook-up, as additional elements or wires are usually required to obtain added reliability. However, this slightly higher initial cost is usually compensated for by dividends in operating security and reduced maintenance.

Mechanical interlocking is usually provided on reversing controllers to prevent short circuits between phases of the power supply. A mechanical interlock between the forward and reverse contactors prevents more than one contactor coils from being energized. Figure 1 illustrates such a circuit with a low-voltage protection scheme of wiring. The push button circuit is such that it is possible to energize both forward and reverse contactor coils at the same time. Under such operation the rotation direction of the motor cannot be predicted and unnecessary strain is placed on the mechanical and electrical apparatus. When the motor is being operated, it is necessary to operate the stop button before the opposite direction push button and contactor becomes effective in the circuit.

Figure 2 is similar to the previous scheme except that the push buttons are wired differently. No additional apparatus is required for this control scheme. Such a circuit is advantageous over the first scheme as it is impossible to energize either coil if both forward and reverse buttons are operated simultaneously. When changing the rotation direction it is not necessary to operate the stop button as the holding circuit to the energized coil is automatically broken when the desired direction button is operated. This particular scheme requires two more wires to be run from the controller to the push button station

than that scheme shown by Figure 1.

The addition of a normally closed interlock or auxiliary contact to each contactor provides complete electrical and mechanical interlocking. One contactor coil cannot be energized unless the other contactor is completely open. The opposite direction contactor coil circuit is always open as long as the other contactor is closed or even partially closed. Such a scheme as shown by Figure 3 is the most desirable of the three as it not only provides additional safety of operation but also reduces wear and strain on the mechanical interlock.

Many standard duty start-stop push button stations are mechanically constructed so that the make and break units have a common point. As only three wires may be connected to this type of station, it is known as a "3-wire push button station." Adapting more than one station to a control circuit is sometimes difficult because of this common point mechanical construction.

Figure 4 shows two 3-wire start-stop stations applied to a line starter. This particular scheme requires only three wires to be run to the stations from the controller. However, it has a serious disadvantage as the No. 1 start button is effective even though the No. 2 stop button is held down. Such a scheme might cause an accident as the operator might depress the No. 2 stop button and believe the machine safe to repair or adjust. If the No. 1 start button is accidentally operated, the motor will start and may injure the workman.

This same apparatus may be wired as shown by Figure 5 and the objectionable feature will be eliminated. This circuit requires four wire connections between the controller and push button stations. The expense of the additional wire is a small price to pay for complete safety. The stop button should always be supreme for controlling the starter and should not be by-passed at any time if complete safety is to be secured.

Many machine operations require "inching" or operation of the motor for periods only as long as the inch push



RELIABLE CONTROL circuits speed production, insure safety and conserve time of operators.

button is held down. Figure 6 shows an inching circuit in which the inch button is effective only when the stop button is held down. Holding the stop button down breaks the coil holding circuit and provides the circuit from the inch button to the coil. A disadvantage to this circuit is that two fingers must be used to operate the two buttons to do the inching operation. If the stop button is released slightly before the inch button, the upper contacts of the stop button may be closed before the Ma auxiliary contact has opened. This will re-energize the contactor coil and permit the motor to operate even after the inch button is released. If the contactor is massive and slow in operation and the stop push button is light and fast in operation, this false operation is almost certain to occur.

The objections to the previous scheme may be corrected by using a maintained run-inch push button in the coil holding circuit as shown by Figure 7. After the run-inch button has been operated for run or inch as desired, the start button may be operated for starting or inching by only one finger. This satisfactory control scheme may be obtained by adding only a latching push button unit to the apparatus of Figure 6. A fully automatic inching controller requires the addition of a control relay.

Circuit interlocking applying to a two speed motor controller with a compelling relay and d.c. general purpose motor applications will be described in the second article in this series. CONTINUOUS ROWS of 3-lamp fluorescent units on wireways at roof truss level clears area for production.

Lighting for Plane Production

N the field of illumination, a new aviation plant in the East is outstanding in a number of important respects. It is an excellent example of the new standard of industrial lighting created by the fluorescent lamp; it is one of the first applications of fluorescent lighting at mounting heights definitely above the so-called low bay classification; and it is also an excellent example of the continuous wireway type of installation.

In this aircraft plant, the class of operations performed ranges from machining of small parts at the lathe, through press and work bench operations, to final assembly of a complete aircraft. Working levels vary from 3 feet to 12 feet or more above the floor, and much of the work is performed on bright metal surfaces. To provide the accurate comfortable seeing required for such varied operations and working conditions, high level general illumination from fluorescent lamps has been a dominant selecContinuous row three lamp fluorescent units at mounting heights above the low bay classification provide high quality illumination in a new airplane assembly plant.

By Gilson W. Beals Chief Engineer, The Miller Co.

tion for the aircraft manufacturing plants of the country. In this new plant, such a general illumination is provided over the entire interior, so that any of the above operations can be performed anywhere in the plant without regard to the location of the lighting equipment. Production equipment, its arrangement, and operations are completely independent of the lighting system.

As may be inferred from the photo-

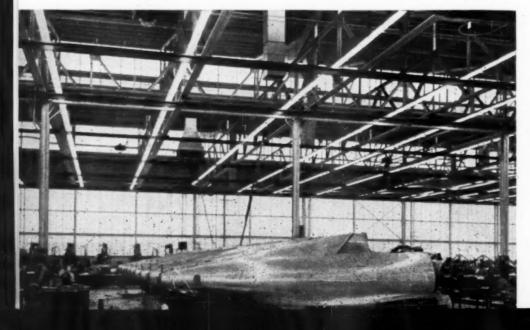
graphs, the building is a one-story steel structure covering a huge area. The main section of the building used for final assembly is 35 ft. 6 in. to the bottom of the roof trusses, and in adjoining sections 20 ft. 6 in. The roof trusses are of considerable depth, run crosswise of the building, and carry monorail crane equipment. The rows of lighting equipment, therefore, are located between trusses and slightly above their lower edge. The rows of lighting equipment at the 35-ft. mounting level are on 21-ft, 6-in, centers, and each consists of a continuous wiring channel carrying 112 reflectors end to end, with three 40 watt 3500° white mazda F lamps per reflector. In the low bay areas, the same equipment is on 16-ft. 8-in. centers. Measurements made after 200 hours of operation showed 36 foot-candles of illumination, with the uniformity and freedom from shadow that is essential to accurate and comfortable seeing.

The Miller continuous wireway equipment used in this installation is a recently improved type in which the wiring channels are constructed with continuous holder grooves which permitted their attachment to clamp type holders at any point along their entire length. This feature was of exceptional value in that it permitted rod suspensions to be hung directly from the roof purlins on whatever centers the purlins occurred, and therefore the installation did not require the special mounting arrangements that are necessary when the spacing of suspensions must conform exactly to wiring channel lengths.

In this installation, the clamp holders were mounted at the proper level from [Continued on page 38]

Electrical Contracting, May 1942

COMFORTABLE SEEING for work on bright metal surfaces is provided by the diffusion and low brightness of continuous row fluorescent lighting.



Compact Stator Stripper

A Cincinnati motor shop transformed an old drill press into an efficient modern stator stripper. Here's how it was done.

NVENTIVE ingenuity has come to the fore in the small motor repair department of the Willey-Wray Electric Co.; enterprising motor repair organization in Cincinnati, Ohio. What was formerly an abandoned drill press frame is now an efficient, motor driven stator stripper, that lops off man hours on small motor repairs.

To accomplish this, Frank Willey mounted a 1½ hp. 3300 r.p.m. gear motor to the vertical movable head of the drill press. The bottom of the motor shaft is equipped with a small circular saw; the top of the motor is coupled to a coil-pulling cam with mounting holes at 4-in., 5-in. and 6-in. radii to take the pulling tongs. A light, mounted inside the vertical head, illuminates the work on the cutting table. A foot switch operates the motor driven saw and pulling cam.

Miscellaneous accessories used include a pair of heavy pliers with strong handles welded on and attached to a chain to form the coil puller; three centering cones with shafts to fit the table center hole: two stator clamps made from bolts and old bearings, to fit the table "T" slots; two blocks to give winding clearance while supporting the stator and a combination wrench and

The stator stripping operation on the new machines involves these steps:

- The stator is placed, coil connection end up, on the two parallel steel blocks on the table. The table, of course, has been raised or lowered to the proper height for the stator.
- The stator is centered on the table by inserting a centering cone of the

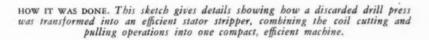
coil pry bar to fit all adjustments.

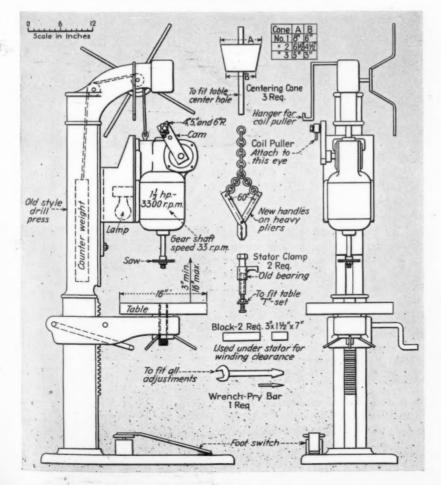
ter and puller reduces stator stripping. time to a minimum. A motor and a few gadgets mounted on an old drill press frame did the trick.

proper size, depending on inside diameter of the stator. When the stator is clamped to the table by the two special clamps, the centering cone is removed.

- The saw is then lowered to a level just above the top of the stator core and the table moved sideways until the saw cuts through the coils. The table is then hand rotated through one revolution while the saw cuts through the tops of all coils, which usually come off as a complete collar.
- 4. The stator is then turned upside down and again clamped approximately in the table center-but without use of the cone. The table is swivelled so the coil nose come under the cam puller.
- The pulling tongs are attached to the eye of the cam and placed so as to grip the stator coils. The first coil or two must be pried out of normal position to allow the pulling tongs to get a secure grip. The table is hand rotated until all coils have been pulled out.

The design and construction of above piece of equipment have been approved by the National Certification Board of the National Industrial Service Association. It typifies American ingenuity as it is being harnessed today, to the reclamation of idle and obsolete machines to bolster the production front in our war effort.







23

STREAMLINED BREWERY W



MAN LIFT to permit personnel quick access between floors and keep elevators for freight. Two of these were installed.



GOVERNMENT METERING CELLAR, lighted by more ornamental fluorescent units in keeping with appearance of this corridor.

Continuous flow of product skillfully planned by contractor in design of wiring for an intricate conveyor system, interior lighting and power distribution through cellular steel flooring at Acme Brewery in San Francisco.

By W. A. CYR



FLUORESCENT LIGHTING, tram-rail conveyor system, and stubs from floor to individual motors on bottling machinery can be seen in this view of the bottling floor.

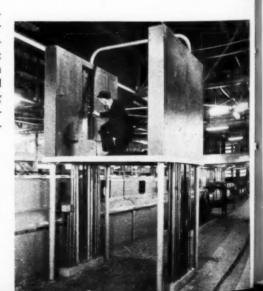
INSPECTION LIGHT, also fluorescent, over the bottle line near center. Inserts to cellular floor ducts can be seen in the floor. Every insert and stub to motors was heavily waterproofed.

HE Acme Brewery, San Francisco, is one of the most interesting industrial electrical jobs in the bay region. The work included intricate interlocked electrical control for an equally intricate conveyor system, use of cellular steel floor for electric distribution, fluorescent lighting throughout, a central transformer vault, and an elaborate inter-communicating sound system. The complete electrical engineering as well as the installation was done by the electrical contractor, Buzzell Electric Works of San Francisco.

Structurally the five story and mez-

zanine concrete and steel bottling building, 137 by 275 ft., adjoining the older building of Acme Brewery, is streamlined and modern in design. Almost the entire face of the building is in structural glass brick especially tinted in amber to prevent light from affecting the beer. This same attention to lighting was paid to the selection of fluo-

ELEVATED distribution centers on the bottling floor give free aisle access and keep electrical equipment away from wet floors. Note concrete curb around risers from cellular floor, and polarized power outlet for welder in small box at the risers.





MODERN not only in amber tinted glass brick but in its electrical system engineered by a contractor, is this San Francisco brewery.



CENTRALLY LOCATED on the third floor, a Pyranol transformer substation feeds the new plant. Lighting for that floor is taken off the bank of air-type transformers on the left

CELLULAR FLOORING with crossover and access units before the concrete pour. All fittings were heavily waterproofed because of prevailing moisture in the building.

tests were made with fluorescent lamps to determine whether their light radiation would affect the product. As a result, 2800-deg. K white F lamps were selected for all lighting.

The bottling building was equipped for a straight line flow of materials through the equipment. The ground floor is made up of 12 inside loading platforms at which two trucks can be loaded or unloaded at one time. Each doorway is equipped with a motor-operated door. There are 16 such doors in all. Empty bottles in cases are removed freight elevators and two man-lifts.

rescent for artificial lighting. Extensive from the trucks, put on a conveyor system which distributes the empties either to storage on the second, third and fourth floors or diverts a certain percentage immediately to the washing and soaking machines for refilling.

> All the bottling equipment is on the fifth floor. From there the filled bottles are delivered by the intricate conveyor system to storage on the intermediate floors or delivered directly to the trucks at one or more of the main floor platforms. In addition to the conveyor system, the building is equipped with two

In order to eliminate long feeder runs and to give better voltage distribution, the main distribution transformer bank for this building was located on the third floor. Adjacent to the main panel in a wire mesh enclosure was located the bank of three 250-kva. transformers, pyranol filled. Such transformers can be used indoors without a special vault. The 4,160-volt primary line was brought into it underground from the plant's main switchboard in the engine room and buried in the concrete walls.

Secondary power at 440 volts is sup-

[Continued on Page 77]



FROM SPECTACULAR DISPLAY of exterior building illumination, the Wrigley Building floodlighting units entered Naval service. After the building was blacked out, the units were loaned to the U.S. Navy at the Great Lakes Training Station.

ROM spectacular commercial service to active duty in the U. S. Navy is the story of the floodlights that have long made the Wrigley Building in Chicago an imposing tower of light. Soon after Pearl Harbor, the building exterior lighting was blacked out as a precautionary step. Instead of letting the lighting units lie idle, the Wrigley Company offered them to the govern-

FLOODLIGHTING At Great Lakes

Chicago's famous Wrigley Building floodlights have joined the Navy for the duration. They are now used for protective floodlighting and all-night construction at the Great Lakes Naval Training Station.

Tonight and every night, this same 120,000 candle-power illumination plays a vital role in expediting night construction and protecting the Naval Station at Great Lakes. The 120 units, each of 1,000 candle-power, were dismantled at the Wrigley Building, shipped to the Naval Station and installed at strategic points throughout the present 500 acre station and the newly developed 360 acre tract which will in-

ment and the Navy was quick to accept.

developed 360 acre station and the newly developed 360 acre tract which will include three new camps—Perry, Dewey and Lawrence. Construction work can now proceed around the clock, permitting this huge project to be completed in half the original estimated time. And the protective lighting feature permits the release of a large number of guards

for other duties.

The units were distributed and in-

stalled throughout the area by the Hoffman Electric Co., Chicago, the electrical contractors on the project. The flood-lights are mounted on portable platforms and structures which can be pole or ground mounted to floodlight the construction of the several hundred buildings of various types at the Station. The entire installation is of a temporary nature, fed from pole lines, and can be quickly and easily moved about to follow the progress of the building construction.

A cooperative precedent has been set here that undoubtedly will be followed throughout the nation. Lighting equipment, that would have been idle for the duration, has been put into useful service on our home front. It's one more way electrical equipment is helping Uncle Sam in his battle for Victory.



TO CONSTRUCTION FLOODLIGHTING and protective lighting at the Naval Training Station go units that otherwise would have been idle for the duration. All night construction is facilitated by 120 of these portable units (U. S. Naval Official Photograph)



TEMPORARY INSTALLATION of portable mounted floodlights on pole crossarms. Units can be easily and quickly moved from point to point as building construction progresses. Each unit provides 1,000 candle-power of illumination. (U. S. Naval Official Photograph)

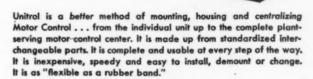
LET THIS TIME-SAVING, SPACE-SAVING, PRODUCTION-SAVING METHOD OF HOUSING AND CENTRALIZING MOTOR CONTROL SERVE YOU NOW

Every moment of delay, every extra and unnecessary machining, assembling and installation operation, every unnecessary interruption to vital production, every diversion of manpower from production to maintenance now assume tremendous importance. They must be eliminated. That is why men responsible for the fate of America's production effort are turning to Unitrol . . . the modern and better way of housing, installing and centralizing Motor Control.

Whether it's Motor Control for a single machine or Motor Control for an entire factory, Unitrol makes the task of its installation, servicing, change, extension or contraction so much easier that plant after plant is adopting Unitrol.

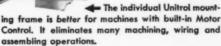
For those who don't know the many contributions of Unitrol to speed, space and production, there's the 32-page booklet "Unitrol . . . the next step forward in Motor Control progress" ... free for the asking. Only, ask for it now. CUTLER-HAMMER, Inc., 1306 St. Paul Avenue, Milwaukee, Wis. Associate: Canadian Cutler-Hammer, Ltd., Toronto.

> 1892-1942 SOTH ANNIVERSARY





The individual Unitrol Section houses Motor Control for several motors or motorized machines, is compact, spacesaving, convenient and eco-nomical. No supports, no other structures or preparation necessary.





The complete Unitro: Control Center houses all the control and control equipment in the plant, for easy, speedy man-power-saving installation, maintenance, change, expansion or curtailment. No wall or floor preparation. No racks, trellises or frames. Permits installation of more than double as much control in same space.





Build your Fluorescent Lamp replacement business on the top quality lamp



SELL

Westinghouse Mazda



America's tremendous war production task demands using more light longer. In thousands of vital plants, factories, and offices, fluorescent lamps are now on 24-hour duty. This means the renewal business of Westinghouse Mazda Fluorescent Lamps will be bigger than ever.

By offering prompt service on this unprecedented fluorescent lamp replacement business in your territory, you help serve American Industry. Remember, better, brighter fluorescent lamps are important to America's battle of production. They help speed production reduce fatigue, make sustained precision work easier and more accurate.

Let's keep America's mills and factories supplied with the fluorescent lamps recognized for top-quality and dependability—Westing-bonse Mazda Fluorescent Lamps.



Westinghouse Research helps make finer fluorescent lamps

Today's Westinghouse Mazda Fluorescent Lamp is one of the finest, most efficient, and most economical of all artificial light sources. Many of the refinements which have brought these modern lamps to their present high efficiency are the result of Westinghouse Research. And you can look to Westinghouse for the new developments which will offer still greater improvements to the brightness, economy and lasting qualities of fluorescent lamps.

Be sure to enlist the cooperation of your Westinghouse Mazda Lamp Distributor. He is constantly informed of the latest advances in fluorescent and is thoroughly familiar with timesaving practices in designing and installing economical lighting systems. Make use of his services by calling him today. Westinghouse Electric and Manufacturing Company, Lamp Division, Bloomfield, New Jersey.

For DEPENDABLE Fluorescent Lighting consult your Westinghouse MAZDA LAMP DISTRIBUTOR



Idle Equipment Urgently Needed

In our effort to win this war by all-out production we've got to make use of every available piece of equipment. Automobile plants and other large manufacturers are pooling their idle machines. Power company sales engineers are noting idle equipment in plants they visit. NISA operates a used equipment exchange for its members.

Contractors might well follow suit and compile their own list of used electrical equipment from their own shops, from customer's premises, from motor repair and service shops, from used equipment dealers. There's a lot of life left in used equipment when properly repaired.

A free exchange of this type of information within our industry is important today, especially for emergency repairs and maintenance.

Only Essential Construction

The order halting non-essential construction, issued by WPB on April 9, is not unexpected. Practically, from the standpoint of the electrical construction industry, it is only an official restriction carrying out a policy already prevailing as a result of priority controls. Heretofore a builder could start a job and carry it through if he could round up the scarce materials needed. Now he must obtain permission to build.

The purpose of the new order is to conserve labor, material and construction equipment urgently needed for war work. Construction already under way, maintenance and repair jobs are not affected. Residential jobs under \$500, farm building under \$1000 and commercial, industrial, recreational, institutional and utilities construction under \$5000 are also exempt. Jobs of all types with priority ratings will proceed normally.

Working as we are with some of the most scarce materials in the critical list, the electrical wiring supplies and equipment available to the kind of projects the order lists are limited to rapidly diminishing inventories in the hands of contractors and jobbers not earmarked for priority rated work. No one knows how much of this material is left but the quantity cannot be large. It is unlikely that, excepting for some already serious local dislocations, the new order will have any important industry effect.

Learning How Together

It's interesting to see a group of electrical contractors, all seasoned business men, spend three hours a week, at one sitting, learning how to estimate systematically; to exchange job experiences; to challenge estimating theories and labor units; and to really get down to the "how and why" of the game.

A Chicago group has had 10 weeks of it. They are clamoring for more, and getting it.

When 50 to 60 business men spend from 50 to 60 hours of their leisure time attending estimating classes, paying for it themselves, and putting additional hours to completion of home work assignments—it's a good sign that "guesstimating" in our industry

is on the way out. All to the good. There is no place for guesswork in the electrical construction industry today.

Classes of this type, engineering discussions, repair and maintenance sessions, construction method sessions, can contribute much to the welfare of our industry. Let's have more of them. The industry, the firm, the individual, and the customer will benefit.

Save on Solder

One of the critically scarce materials today is tin. The supply of solder, dependent upon tin, is also heavily taxed by new war industry demands. The need for immediate conservation of solder is urgent. And wiring is one place it can be conserved easily.

An entirely solderless wiring job is no rarity. In fact, it would be a good idea to shelve the soldering torch for the duration. Pressure connectors make a better splice or tap, take less time and cause less trouble. They are available today for any kind of wire connection needed, from fluorescent canopy hookups to service entrance lugs. And their use will save a significant amount of solder.

Why Dime Store Material

In times like these, the presence of large quantities of critical wiring materials on the dime store counter and in the chain store salesroom is an affront to an important industry struggling to maintain some vestige of public service under ever increasing priority restrictions.

The electrical contractors who normally keep our homes, offices, and stores free from hazardous wiring defects, who are on the spot to repair breakdowns, and who are using their own small stocks of materials without any signs of being able to replace them are confronted with serious material shortages. One contractor who needed cable to replace a dangerous feeder run to a grocery store refrigerator finally found ample quantities at the local dime store.

These stocks should be requisitioned at once and distributed through the regular trade channels to electrical contractors or frozen for use on essential projects. The argument that they reach essential civilian users who do not have access to priority channels is wholly untenable. For every foot of dime store cable that goes into essential repairs a hundred feet goes into a new basement rumpus room or an outlet for Junior's American Flyer.

In the hands of electrical contractors, wasteful use is automatically avoided. They know the scarcity and the urgent need for the strictest economy. And real essentials will get first treatment, for even the most inveterate hand mechanic will call in a contractor when there is important wiring trouble. We can't win a war selling precious strategic materials over the dime store counter.

Give Them Protection

Protection against sabotage is a vital problem of plant management today. Large plants have well organized guard patrols, extensive protective floodlighting and electric eye systems.

What about the hundreds of small plants now doing defense subcontract work? Are they resting on a false sense of security—a security that was enjoyed during civilian production, pre-war days?

Protection of these plants is as vital as that of large prime contractors. Saboteurs realize the value of stopping small parts production. The haphazardly or wholly unprotected subcontract plant lies easy prey to enemy agents.

Management, inspectors and electrical contractors, who are converting these plants to war production, have an obligation to see that adequate protective equipment is recommended and installed. Let's beware of an "industrial Pearl Harbor."

Patch Work Must Be Safe

Restrictions on vital materials will undoubtedly lead to considerable "patch work" to existing electrical systems and equipment. This form of maintenance has always been frowned upon. But we are in an emergency period and we must do everything in our power to save critical materials

and yet keep production upward.

Let's be cautious, however, and make it safe. Make sure too that it will do the job. Can we cut a coil out of a motor and still have it work effectively? If so, O.K. for now.

But let's label the patch work jobs distinctly as such. They'll serve for the duration—but they should not be lost and forgotten.

Mass Trouble Shooting

Have you ever seen 17 competitors walk arm in arm to shoot trouble in a single electrical installation. Well, Kansas City, Mo., has.

Members of the adequate wiring group of the Kansas City section I.E.S. converged, like internes in a surgical ampitheater, on a fluorescent lighting installation that was acting up. Led by Art Smiley, they proceeded to track down the trouble, fixture by fixture. When they finally found it they analyzed and remedied it.

Seventeen contractors—not just one—went back home knowing the how, what, and why of that particular trouble. And, in the future, the jobs of 17—not just one—contractors will be free of that troublesome "bug."

An object lesson? Yes, but, better still, an outstanding example of a cooperative action that will strengthen our industry; a cooperative pooling of talents and interests that will help the contractor do his part in our all-out war effort.

Machine Tool Wiring Standards

A standard of wiring practice for machine tools is close to official adoption. With a recommended addition of a couple of paragraphs to article 430 of the National Electrical Code, the new rules will line up with the NEC throughout.

There are still some obstacles to the general acceptance of the new standards. One of them is the occasional local code that varies from the N.E.C., another is the special requirements of customers. Both of these problems can be overcome in time, the chances are that local cooperation can be arranged and customers today are not

inclined to quibble over details of control arrangements when they need machines.

The standards will go a long way to correcting a wiring problem of growing importance. Machine tools are more elaborately equipped every day. They represent a wiring job that must be protected against hazards to life and property. The standards will give the designers a long needed frame of reference from which to work.

For Services Rendered

An example of loyalty worth thinking about was recently brought to light at Minneapolis. Two members of the Minnesota Electrical Association who have closed up shop and are now in defense work at outlying U. S. territories, sent in their 1942 dues. They wanted to see the association activities continue and they wanted to carry their share.

They are to be congratulated for continuing their contribution to organized thinking and action in their industry. But an orchid, too, to the association, for loyalty like that is earned only by hard, unstinting work year in and year out for all its members.

Exit Trade Secrets

Some contractors have long been operating under the false premise that success was due to "trade secrets." Too many have tried to play a lone hand without benefit of the progressive ideas that are born at the conference table.

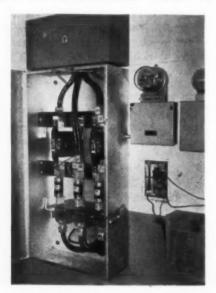
Since the advent of our huge war construction projects others have joined hands, pooled ideas, talent and equipment and developed revolutionary construction methods. Embryo ideas, from the minds of many, have grown to be efficient labor saving methods. And contractors throughout the country are rapidly following suit.

The sooner we recognize the practical value of exchanging ideas and experiences among ourselves, the better off we'll be. Cooperative industry effort is going to win this war. And a cooperative united spirit among electrical contractors is going to make for a bigger and better industry.



COMBINATION ENCLOSURE

Compactness of space, without sacrifice of working room, and labor saving are features of a 600-ampere, 230-volt, Trumbull combination entrance switch and current transformer cabinet in-



ALL-IN-ONE entrance switch and instrument transformer cabinet permits economy of space and labor. Compact arrangement has ample working space for heavy cables.

stalled at the Connecticut Tool and Engineering Co., Bridgeport, Conn. Ray Walsh, electrical contractor, used this unit as the service switch for the power system at the above plant.

The combination follows the switchfuse-meter sequence. Service mains enter the back of the lower part of the enclosure and terminate at the switch lugs on the line side of the blades. The instrument transformers are inserted, in two phases, between the load side of the fuses and the outgoing feeders which leave the top of the cabinet. The enclosure has sufficient working space to permit the bending and offsetting of heavy cables.

The installation of this equipment left the adjacent wall space free for other equipment.

U-CLAMPS SUPPORT FLUORESCENT FIXTURES

Messenger cable, on 14-foot centers, was used to support a 40 foot-candle fluorescent lighting system in a recent industrial plant installation. Because of the 12-foot spacing, fixtures were spotted between as well as under steel roof trusses. To secure the proper mounting heights the units were rod suspended from the cable. Straight-through wiring of the fixtures was accomplished by suspending the conduit interconnections from the same messenger cable.

Fixture suspensions consisted of L-shaped rods which were fastened to the messenger cable with an ordinary U-type cable clamp. The same clamp was used to fasten a rectangular strip iron leveling device for supporting intermediate conduit fixture connection. An eye bolt with a double nut arrangement was mounted to the iron rectangle. Adjusting the upper or lower nut on the bolt, raised or lowered the level of the conduit runs.

The messenger cables were secured to the under side of the roof truss flanges by cable clamps mounted on flat iron strips clamped to the trusses. Turnbuckles at the ends of the cable runs were used to make the messenger taut after installation.

The use of this simple method of suspension eliminated the necessity for a variety of special clamps, eliminated all drilling of steel roof trusses and considerably reduced installation manhours. It is one more idea that can be used to speed up electrical construction to meet the present wartime tempo.

SUPERVISORY CONTROL PANEL

Down at the new Washington National Airport, Gravelly Point, Va., the maintenance engineers can easily tell when and if either the two 2000 kva 3-phase, main incoming line transformers or the two 500 kva., 3-phase low-voltage network distribution transformers are in trouble.

How? Through a transformer vault supervisory system control board located in the Central Heating Building which also houses the main distribution board for the entire airport lighting and power system. The two network distribution transformers are located in the Terminal Building, about 1500 feet away.

The board contains a series of pilot lights, annunciator drops and signal bells connected to control circuits on the incoming line breakers and trans-



SIMPLIFIED MOUNTING of messenger suspended fluorescent fixtures uses an ordinary cable clamp; eliminates complexity of fittings and reduced installation time.

IDEAL Wire Muto AYAILABLE: SAVE CRITICAL MATERIALS

Save LEAD, TIN and RUBBER

as used in solder-and-tape joints

MAKE FASTER, BETTER CONNECTIONS IN ALL WIRING WOR

offer former solder-and-tape users an opportunity to make a mighty important contribution to the War Program. Since Lead, Tin and Rubber, as used for solder-and-tape joints, are not required for "Wire-Nuts", each and every "Wire-Nut" joint represents a saving of critical materials.

Considering that thousands of Contractors are making millions of wire joints in war plants and homes, "Wire-Nuts" are playing a vital part in helping to win Victory.

WireMutDare easy to use. Simply—

STRIP



SCREW



THAT'S

Wire Mutto help to speed wiring, assuring maximum war production—sooner!

make safe, trouble-free and permanent wire joints. An inner cone shaped spiral spring automatically compresses the wires and twists them together in one operation as the "Wire-Nut" is applied. Better Electrically—Stronger Mechanically.

SIZES FOR EVERY JOB—For small conduit fittings, as well as sizes large enough to join 3 No. 10 wires. FULLY APPROVED: Listed by Underwriters' Laboratories, Inc.

Write For FREE Samples — Today
MILLIONS IN USE!

SOLD THROUGH JOBBERS

Cut-away view of IDEAL "Wire-Nut" shows how clean threads are pressed (not cut) into wires, automatically twisting them together as they are applied.



1/4" molded composition shell, unaffected by heat, cold or moisture.



Speed up Fluorescent Fixture Installations and Repairs.



Make a neater, better, safer wiring connection anywhere. Compare "Wire-Nuts" with old-fashioned solder-and-tape joints

OTHER IDEAL PRODUCTS TO SPEED UP WAR-TIME WIRING JOBS



Serving Industry Since 1916 + Over 35,000 Users

IDEAL COMMUTATOR DRESSER CO.

1041 Park Avenue

SALES OFFICES IN ALL PHINOTPAL CITYS



WEST DODD PROVIDES SIMPLE AND RELIABLE PROTECTION AGAINST LIGHTNING...

Lightning is a powerfully destructive force. And records of the National Board of Fire Underwriters' prove it ranks at the very top as a source of fire. But, if properly controlled, it can be tamed at reasonable cost before there is any chance of stalling men and machines engaged in vital war work.

PROTECTS ORDNANCE PLANTS

West Dodd lightning and static control equipment is being widely installed in Uncle Sam's ordnance plants for this reason. West Dodd is also protecting the power stacks and even factories

and even factories of many important war industries.

been especially designed and built to meet U. S. Government specifications. Approved by American Institute of Electrical Engineers, National Board of Fire Underwriters', and many other authorities. Equipment inspected and labeled at the factory by Underwriters' Laboratories, Inc. Backed by the oldest manufacturer in the field.

West Dodd Systems are IMMEDI-ATELY AVAILABLE for defense use. Write, wire, or telephone today for further information.

WEST DODD

LIGHTNING CONDUCTOR CORP.



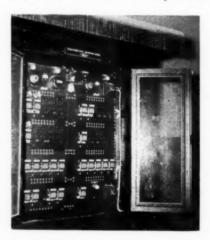
FREE The West Dodd Engineering Dept. will be glad to assist in planning application, or estimating costs.



IFROM PAGE 321

formers and the feeder breakers and network protectors of the distribution transformers. Each breaker and protector contain auxiliary contacts which indicate the breaker position and trip it in case of trouble. The lights on the board indicate if the breaker or protector are in or out.

This supervisory system is also tied in with the temperature-pressure devices on the transformers. If any trans-



WARNING SIGNALS of transformer and heavy circuit trouble are given by this centrally located supervisory control panel at the new Washington airport.

former acquires an abnormal oil pressure or temperature, an annunciator indicator drops out at the board and a bell rings warning of the condition. By noting which drop has fallen out, the engineer can see which transformer is in trouble.

The control wiring and all equipment connected with it was installed by Harry Alexander, Inc., electrical contractors who did all electrical work in the airport buildings.

PARTITIONED CORNER PULL BOX

A specially designed pull box, with steel partitions, was used by the Hixon Electric Co., Boston, Mass., to make a right angle turn, at different elevations, with a large group of feeder conduits. Included in this group are ten 3-inch, three 2-inch and one 1-inch conduits which enter the bottom of one side of the box and leave at the top of an adjacent side to clear an air duct.

The box, which is 7-ft. long, 4-ft. wide and 18-in. deep, weighs 1500 pounds. It is suspended from the con-



IN DEMAND
MORE THAN EVER

For

Maintenance and Repairs

PANTHER AND DRAGON TAPES



Sold Exclusively Through Distributing Wholesalers

HAZARD INSULATED WIRE WORKS
DIVISION OF THE OKONITE COMPANY
Works: Wilkes-Barre, Pennsylvania

Offices in Principal Cities

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First to be Wrapped and Sealed in Cellophane

8

Perfect Adhesiveness and Tensile Strength

0

Strong Distinctive Green Core

4

Colorful Attractive Boxes

9

A Company in the Insulation Business Since 1878

PANTHER # DRAGON

RUBBER AND FRICTION TAPES

LATROBE



FLOOR BOXES

and

WIRING SPECIALTIES

No. 110 "LATROBE" WATERTIGHT BOX

> Here is a cut-away view of the No. 110 Watertight Box showing how the tapered unit receptacle fits tapered opening in top of box body. This box is constructed of fewest number of parts, may be installed quickly, provides ample wire space inside the box and makes a safer job.

Latrobe Floor Boxes and Wiring Specialties are definitely cooperating in the war effort.

Decreased installation time, flexibility of use, safety, durability and long service are time-saving contributions toward greater production.

The Latrobe line is complete, including approved types for commercial, industrial and residential jobs.



PIPE OR CONDUIT HANGERS

No. 70 hanger handles ½", 34" and 1" pipe to steel beams 36" thick. Turns freely. No drilling or use of straps.



GANG ADJUSTABLE BOXES

No. 252-R Floor Box with No. 206 and No. 207 Nozzles. Minimum height to top of cover plate 3½". Box bodies 3" high. Shallower boxes furnished when required.



NOZZLES FOR FLOOR
OUTLETS

Models for all types of "Latrobe" Waterlight Floor Outlets. No. 285 is a double duplex receptacle nozzle, with \(\frac{1}{2} \)" brass pipe extension. Furnished also with \(\frac{3}{4} \)" pipe extension.



Check your stock and let us know your requirements. We will make every effort to ship when wanted.

FULLMAN MANUFACTURING CO. LATROBE . . . PENNSYLVANIA



[FROM PAGE 34]

crete ceiling by six \(\frac{1}{8}\)-inch bolts which extend through the ceiling and terminate in steel bearing plates. Thirteen steel right angle barriers isolate each circuit that enters and leaves the box. In addition to keeping each feeder separate,



INDIVIDUAL RACEWAY for each circuit is provided by the steel barriers in this 1500-pound corner pull box. Arrangement isolates circuits and insures localization of trouble on any one feeder.

this arrangement prevents a short circuit in one from affecting the others.

The sides and barriers of the pull box have holes drilled and aligned in such a manner that ½-inch fibre-covered rods can be inserted to support the cables. A two-section screw cover fits over the open face of the pull box.



INSTRUMENT TESTING was necessary for the heavy run of work in the repair department of Quality Electric Co., Los Angeles. This larger space in what used to be the display room has resulted. An exceedingly complete testing board at the rear facilitates checking the repaired instruments. Future additions will include a below-freezing temperature, low atmospheric pressure cabinet in which to test electrical equipment for stratosphere airplanes.



vital. For that reason, few items in your plant equipment carry such responsibility as lighting units. Only by providing adequate light-properly directed-can you maintain continuous and uninterrupted operating schedules 24-hours a day . . . day

Adequate, artificial light-properly directed-enables workers to work faster, easier, with greater accuracy, for longer hours with less fatigue. Output is often stepped up 15 to 25 per cent with no increase in manpower, or machinery.

Such production-accelerating lighting performance depends to a large degree upon the basic design and construction of the lighting equipment you install. That's why insistence on lighting equipment bearing the RLM LABEL is an important step in equipping your plant for All-Out Victory Production.

When you purchase Lighting Units bearing the RLM LABEL you know that exacting laboratory and engineering tests have proved that they (1) Conserve light and power; (2) Stand up under the vibrations and heavy-duty service of producing machinery; (3) Require a minimum of time and cost to maintain at their original lighting efficiency; (4) Having uniform quality. Only Industrial Lighting Units built to exacting RLM Specifications, and certified by Electrical Testing Laboratories are permitted to carry the RLM LABEL. Write for booklet, "The Meaning of the RLM LABEL."

The Letters RLM Stand for Reflector and Lighting Equipment Manufacturers



307 N. MICHIGAN AVE.

SUITE 1600 . CHICAGO, ILL.

RLM SPECIFICATIONS Now Available FOR 12 REFLECTORS AND LIGHTING UNITS

RLM Specification No. 1:

Specification No. 2:

Specification No. 3 Symmetrical Angle Refle

Specification No. 4: Silvered Bowl Diffuser

Specification No. 3: 48" Fluorescent Two-Lamp Closed-End Porcelain Enamel Unit

RLM Specification No. 6: 48" Fluorescent Three-Lamp Closed-End Porcelain Enamel Unit

Specification No. 7: 60" Fluorescent Two-Lamp Closed-End Porcelain Enamel Unit

RLM Specification No. 8: 60" Fluorescent Two-Lamp Closed-End Porcelain Enamel Diffuser Unit

Specification No. 9: 48" Fluorescent Two-Lamp Open-End Porcelain Enamel Unit

RLM Specification No. 10: 48" Fluorescent Three-Lamp Open-End Porcelain Enamel Unit

RLM Specification No. 11: 60" Fluorescent Two-Lamp Open-End Porcelain Enamel Unit

Specification No. 12: 60" Fluorescent Two-Lamp Open-End Porcelain Enamel Diffuser Unit

Copies of Specifications Mailed Upon Request



Keeping communications open—keeping power flowing—are mighty important jobs today. These jobs would be impossible without the lineman and electrician whose experience and skill are serving their country so ably.

That these men use and prefer Klein equipment is an excellent testimony. "Klein" to them is an overall specification—a word that means highest in quality whether applied to pliers or climbers, safety belts or straps, grips or other electrician's tools.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York



Lighting For Plane Production [FROM PAGE 22]

a rods hung from the roof purlins. Several sections of channel were assembled on the floor or staging and raised as a unit for quick rigid attachment to the holders.

Primary Service

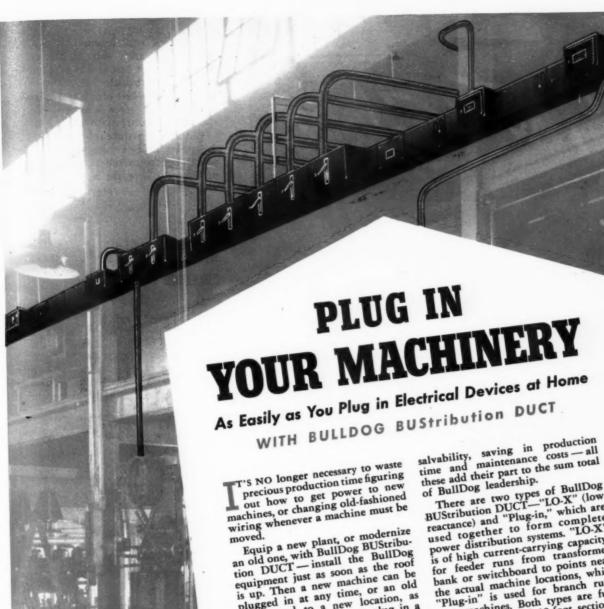
Electrical service is delivered to the plant at 23,000 volts, where it is reduced to 4160 volts and distributed to four 500 kva., 3 phase transformers, each of which supply one quarter section of the building area. All primary installation is by underground feeder to the transformer vaults. The lighting load from the distribution transformers is 4-wire, 3-phase 208/120 volts single phase. In the continuous wireway channel for a row of 112 reflectors end to end there is an average of only three service entrances, including those for emergency and night light circuits.

Continuous Wireways

A saving in wiring materials and installation costs was accomplished by the selection of the continuous wireway system. Each row of 112 reflectors is approximately 500-ft, long and, having a row spacing of 21 ft. 6 in., each row lights an area approximately 10,750 sq. ft., and each reflector would therefore light 96 sq. ft. In a system of individually located fixtures to provide equivalent illumination, the same number of 3-lamp reflectors would be required to light the same area, which indicates that the fixtures would have to be located on approximately 93-ft. by 93-ft. centers. The wiring necessary for these individual fixtures would include at least 112 outlet boxes, the horizontal runs of connecting conduit and the vertical lengths of conduit stems (two per fixture) required to suspend the fixtures from the ceiling between trusses.

Each row of continuous wireway equipment, requiring an average of three outlets for service entrance to the wireway channels, therefore saved approximately 109 outlets, the connecting conduit, and a large part of the labor cost of their installation.

It is indeed noteworthy, therefore, when such a vital industrial plant as this plans its "lighting up for production" with the same thoroughness as it "tools up for production", and accomplishes it with such savings in critical materials.



This run of 750 ampere "Plug-in" Type BullDog BUStribution DUCT feeds motor and welder circuits in a large war production plant. Note individual protective plugs of various types for each machine.



Vacu-Break Switch Plug, with cover open, allowing access to fuses. Horsepower rated, quick make and quick break. Capacities up to 600 amperes. The three types of BullDog protective plugs — circuit breaker, disconnect and operating switch—are standardized and interchangeable, and are offered in a wide range of capacities.

or up. Inen a new machine can be plugged in at any time, or an old one moved to a new location, as simply and easily as you plug in a home electrical device.

Many Real Savings

Day by day, more and more of the country's largest war production Day by day, more and more of the country's largest war production plants are adopting BullDog BUS-tribution DUCT for power wherever and whenever needed. The ever and whenever advantage of BullDog's "plug in" feature is just one of the many reasons for this one of the many reasons for this swing to BullDog. Economy and safety, ease of installation and movability, asset value and 100%

There are two types of BullDog BUStribution DUCT_"LO-X" (low reactance) and "Plug-in," which are used together to form complete power distribution systems. "LO-X" is of high current-carrying capacity, for feeder runs from transformer for feeder runs from transformer bank or switchboard to points near bank or switchboard to points near the actual machine locations, while "Plug-in" is used for branch runs over machines. Both types are fur-nished in standard 10-foot sections, each "Plug-in" type section having 5 plug-in openings on either side. 5 plug-in openings on either side.

BullDog Trol-E-Duct Systems for Lighting and Mobile Power

The complete BullDog line of "Plug-in" Flexible Electrical Distribution Systems includes two other tribution Systems includes two other time and money savers. BullDog Universal Trol-E-Duct, for Lighting, permits the moving of lights or the addition of new ones in a few minatures. BullDog Industrial Trol-E-Duct, for Production Lines and Assembly, for Production Lines and Assembly Benches, furnishes mobile power and support for portable tools.

To learn how to have ready power To learn how to have ready power and light wherever and whenever needed, write for bulletins describing BullDog BuStribution DUCT and Trol-E-Duct Systems. Better yet, and for a call from a BullDog Field ask for a call from a him to show Engineer — and ask him to show you the roster of hundreds of armayou the roster of hundreds of armayou the plants equipped with one, two ment plants equipped with one, two or all three BullDog Systems.

ELECTRIC PRODUCTS CO.

DETROIT, MICHIGAN BuilDog Electric Products of Canada, Ltd., Teronte, Ontaris



urs, Switchhourds, Das Doot Systems—FOR LIBERT AND POWER MANUFACTURERS OF Voca-Break St



a V-shaped seat formed by two ball bearings on each side of the cradle. A motor-driven belt arm is then lowered to spin the armature. A heavy spring fastened to the belt arm retracks it after it is released, since it is only used to start the armature spinning.

With the armature spinning smoothly, the tester holds a piece of chalk or a pencil lightly to the rotating shaft to determine where the high spots might be. The device is quick, easy and simple to operate.

LIQUID SPRAY CLEANING TABLE

A spray table with a built in pump for spraying stripped motors with a cleaning fluid, speeds up repair operations at Roland Electric Co., motor repair organization of Baltimore, Md.

The 40-in. by 66-in. sheet steel table is 30-in. above the floor and is supported

PRESSURE SPRAY with cleaning solvent speeds up stator cleaning at the motor repair department of Roland Electric Co., Baltimore, Md.

by a 2-in. by 2-in. by ‡-in. angle iron frame. At present, it is equipped with a two-sided sheet steel splash hood, 48-in. high. Future plans call for the installation of an exhaust fan, connected in series with the pump motor, to exhaust the fumes while spraying is being done.

Under the table is an ordinary piston operated water pump, belt-driven by a $\frac{3}{4}$ hp. 1800 r.p.m., 3 phase, 220 volt motor. The pump is connected to a 40 gallon drum which holds the cleaning fluid. Under ordinary conditions, about 20 gallons of fluid are used.

The piping system contains a by-pass valve which permits the liquid to be by-passed into the tank when the nozzle of the spray hose is closed. It is made of a 12-in safety valve with a special spring to operate at 25 lbs. pressure.

Special valves of bakelite are used, since this material is not affected by the cleaning fluid.

The used fluid is returned to the storage drum through a 12-in. by 10-in. by 15-in. filter tank attached to the under side of the spray table. The top of this filter tank forms part of the spray table and consists of a removable steel cover with a series of $\frac{1}{16}$ -in. drain holes. The used fluid is filtered through four layers of ordinary burlap which rest on a screen two inches above the bottom of the tank.

An electric hoist above the table is used to handle the equipment. A trigger type nozzle on the end of the cleaning fluid hose provides the pressure spray.

DYNAMIC BALANCER

A handy little dynamic balancing machine has been designed and built by the Electric Service and Machine Company, motor repair shop of Steelton, Pa.

It consists of two large V-shaped angle iron brackets, mounted inverted to the top of a steel table. A cross bar connecting the two brackets supports a spring suspended, free moving, armature cradle. The suspension springs are enclosed in two 1-inch conduits.

The armature to be balanced is placed on the cradle where its shaft rests on



CATCHING HIGH SPOTS on small armatures has been simplified by the construction of this dynamic balancing machine in a Steelton, Pa. motor repair shop. It's a big help.

WINDING SOLENOID COILS

The Jay Electric Company, motor repair specialists of Detroit, Michigan, has a shop equipped to handle everything from the smallest solenoid coil to large motors and transformers.

To expedite production of the small solenoid coils, the shop has one work bench equipped with a number of minia-



MINIATURE LATHE assembly speeds up solenoid coil winding at the Jay Electric Company shop in Detroit, Michigan. Unit is adjustable to accommodate various coil sizes.

ture lathe assemblies, belt driven by motors mounted under the table and operated by a foot pedal.

The coil forms are centered between the chuck and an adjustable foot stock which permits a variety of coil lengths to be wound. A chain driven counter, attached to the shaft, indicates the number of turns wound on the forms.

COIL WINDER

Faced with the necessity for winding coils up to six feet in diameter for transformer work, very slowly—almost inched along on the curves—Wolff Electric Co., Portland, Ore., designed and built a special winding machine.



To every essential industry striving to aid the MORE PRODUCTION war effort, General Cable pledges all possible cooperation . . . in all ways.

GENERAL CABLE CORPORATION

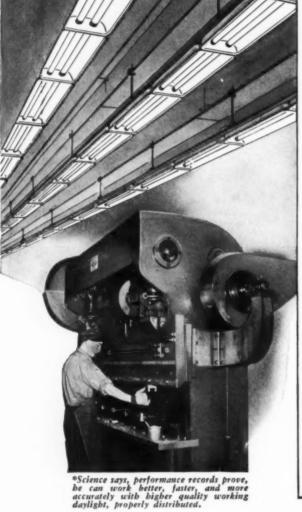
* * * but do you know how fast and economically they can get it * * * with a MILLER Continuous Wireway Fluorescent Lighting System? • There is no fluorescent lighting equipment exactly

There is no fluorescent lighting equipment exactly like the MILLER Continuous System. Built right into it is a continuous wire channel containing all operating auxiliaries and conduit. This means man-hours saved, more jobs handled in less time . . . priority copper and other critical material saved . . . dollars saved, too. It means this new and better lighting system goes in, not fixture by fixture, but complete row after row, all ready to go to work as a war production tool.

Any qualified lighting authority will tell you that illumination of 50 foot candles or better in any of your customers' plants from MILLER 50 FOOT CANDLER or 100 FOOT CANDLER (MILLER TROFFERS in offices and drafting rooms) will deliver more work and better work from more satisfied, eye-fit employees. Write for details and you'll discover you never knew there was such a lighting system as this! (Representatives in principal cities.)

"Fingertip Facts" about the MILLER Fluorescent Lighting System

MILLER Fluorescent Lighting System
HIGHER ILLUMINATION . . . 50 to 100 foot candles or more—
men work better, faster. • 30 TO 50% LOWER INSTALLATION
COSTS . . . Make war production dollars go further. • FASTER
INSTALLATION . . . Steps up building schedules—plants get into
production quicker. • SIMPLIFIED MAINTENANCE . . . Easyto clean, removable reflectors—save man-hours for production. •
UNIFORM LIGHT DISTRIBUTION — Production setup can be
changed without need for touching lighting.



MILER

50 FOOT CANDLER 100 FOOT CANDLER MILLER TROFFERS

Continuous Wireway Fluorescen Lighting Systems

THE MILLER COMPANY

MERIDEN, CONN.

Pioneers in Good Lighting Since 1844

 MILLER offers a complete line of filament and fluorescent lighting equipment



[FROM PAGE 40]

The machine is operated by a one hp. motor with reversing switch, counter shaft at the base of the machine and V-belt drive. Speed control is obtained by a system of cone pulleys coupled with the clever application of an automobile transmission. A Dodge transmission is used, slightly modified



LOW GEAR on the corners. An adjustable speed winding lathe for heavy coils uses auto shift.

by extending the shaft and by bending the operating lever so that it is easily reached and manipulated by the operator.

This transmission has the usual three speeds and all told, from the motor, through the pulleys and the transmission, a speed reduction from 1800-r.p.m. down to 4 r.p.m. is obtainable. A clutch operated by foot pedal is inserted to give the operator instant control in starting and stopping the winding shaft.

SMALL STATOR STRIPPER

The mechanics of the small motor department of the J & H Electric Company of Providence, R. I., with an eye to labor saving devices and reduced unit costs, have designed and built a small stator stripper that pulls out burnt out coils with the greatest of ease and the least amount of time.

Two pieces of 4-inch channel iron, each 2-ft. long and welded to two pieces of 2-inch angle iron, as end supports bolted to the workbench, form the base for the stripping gadget. Two short pieces of 2-inch iron block, mounted at the front and back of the base, separate the two channels and form the cradle for the stator and the spacing for the rotating sheave. The sheave is 5-inches in diameter and is mounted between the channels on bronze bushings, with one end of the shaft extend-



TYPES OF IRV-O-SLOT FILL EVERY SLOT INSULATION NEED

NEW thin types of IRV-O-SLOT described below were developed to provide non-bulking slot insulation for use in confined or limited space:

NEW IRV-O-SLOT	THICKNESS	DIELECTRIC	ADVANTAGE
			Most inexpensive
		600 to 800 VPM	types
Varnished Silk du plexed to Fish Paper		1050 to 1250 VPM	
Special Thin Varnished Cambric duplexed to Fish Paper			Usable in place of
		800 to 1000 VPM	silk
Varnished Fiberglas duplexed to Fish Paper Duplexed to Spauldo	009' to 013"	800 to 1000 VPM	Toughest
		800 to 1000 VPM	1
		and bias-cut Varnisle for every slot r	equirement.

(1) Resin coated fish paper. (2) Resin coated Spauldo paper. (3) Varnished (1) Resin coated tish paper. (2) Resin coated Spauldo paper. (3) Varnished Fiberglas duplexed to fish paper. (4) Yellow straight-cut varnished cambric duplexed to fish paper. (5) Black straight-cut silk duplexed to fish paper. (6) Yellow bias-cut varnished cambric duplexed to fish paper. (7) Black bias-cut varnished cambric duplexed to Spauldo paper. (8) Yellow straight-cut varnished cambric duplexed to Spauldo paper. (9) Varnished Fiberglas, duplexed to Spauldo paper.

IRV-O-SLOT INSULATION consists of Fish or Spauldo papers coated with resin, or bonded by means of a plastic insulator, to cambric, silk or Fiberglas. These insulations possess ample strength and toughness as protection against mechanical stresses. They have high dielectric strength. The duplexed IRV-O-SLOT and Spauldo paper have exceptional heat resistance. The bonded insulations have high majestance exceptional heat resistance. sulations have high moisture resistance.
All IRV-O-SLOT insulation is flexible and easy to form.

This simplifies and speeds application. It is available in sheets and also tape form ready to be cut into slot strips.

For complete data, write for the new Product Information Sheet, EL-45. It tabulates the physical and electrical properties of all nine types of IRV-O-SLOT. Samples and prices will be sent you on request. Write Dept. 96. prices will be sent you on request. Write Dept. 96.



IRV-O-SLOT insulation is used on the Union Switch & Signal Company's Dynamotor Armatures

VARNISH & INSULATOR CO.

U. S. A.



PLANTS AT IRVINGTON, N. J HAMILTON, ONT., CAN.

es in 20 Pris



IFROM PAGE 431

ing beyond the side of the channel. A piece of flexible steel cable, fastened to the sheave, has a 3-inch steel shank hook fastened to the opposite end to grip the stator coils. Two 9-inch lengths of $\frac{3}{4}$ -inch bolt stock, threaded vertically into the channels, 14-inches from the front end of the base, act as a stop for the stator and hold it during



STRIPPING EASE is a feature of this small stator stripping device, developed in the small motor department of this Providence motor shop. Result—unit costs go down.

the pulling operation. These bolts are held more rigid by nuts on the under side of the channels.

When stripping stators, an ordinary ratchet handle from a socket wrench set is used as the lever arm. By doing this, the stripper can be mounted flush with the edge of the work bench, out of the way of aisle traffic. The operator has both hands free to work, one to fasten the hook to the coils, the other to operate the ratchet lever.



RESERVE STOCKS of men and re-built motors of various sizes, pulleys, sheaves and other equipment parts from a large part of the inventory of the Electric Motor Repair Company of Springfield, Mass. It helps create cus-tomer confidence and a feeling of de-pendability toward thus service organ-

SOME HOMELY TRUTHS ABOUT

SWITCHES for HORSES and HORSEPOWER

SOME HORSES WILL GALLOP "GIDDAP" . . . OTHERS NEED TO BE "SWITCHED" WILL RUN FULL SPEED . . . THE STARTING SWITCH ON CAPACITOR AND SPLIT-PHASE MOTORS HELPS TO BRING SPEED AUTOMATICALLY . . . ON WESTINGHOUSE MOTORS THE IMPROVED STARTING SWITCH GIVES POSITIVE CHANGE-OVER FROM STARTING TO RUNNING CONNECTIONS BECAUSE ANNOYING CLICKS ARE HUSHED . . . QUIETLY Jones ACCURATELY BY CUSHIONED STOPS THE SWITCH OPERATES BY CENTRIFUGAL FORCE ... SURELY, BECAUSE EXPERIENCE, AND TESTS / SHOW CONTACTS AND RUST-PROOFED STEEL PARTS GIVE THE MOST DEPENDABLE PERFORMANCE . . . THIS STARTING SWITCH. IS JUST ONE ® OF MANY IMPORTANT FEATURES THAT MAKE WESTINGHOUSE SMALL MOTORS STAND OUT AND STAND UP Vestinghouse

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, EAST PITTSBURGH, PENNSYLVANIA



SPECIAL BEARING COSTS

One of the most important phases of electric motor maintenance, with which all repair men are familiar, is the maintenance and replacement of bearings. Yet, because bearings are mechanical and not electrical features of motors, they receive relatively scant attention in relation to their importance. However, a good share of the motor performance and efficiency, measured in dollars and cents, depends upon the condition of the bearings. Hence, it is essential that they be carefully maintained and replaced when wear becomes evident.

Every motor shop is continually confronted with the repair of motors which

have unfamiliar name-plates. Perhaps their manufacturer has long been out of business, or the motor is so old that parts are no longer stocked by its manufacturer. In any case, bearings that are worn and cannot be repaired must be replaced. And securing them presents a problem, either due to no stock or a long delay in delivery because they must be made up as a special item.

Time is all important in the motor repair business, for you must give your customer service. If you can't produce you will find him gravitating to shops that can. The motor shop can do one of two things in this matter of bearing repair on old motors.

First, the worn bearing may be bored out and relined with a bronze sleeve or babbitt metal. However, sometimes that

part of the bearing which rests in the motor housing may be pounded out of shape and size. Then relining the old bearing will not be much help. The only other expedient is to make a special bearing to fit the shaft.

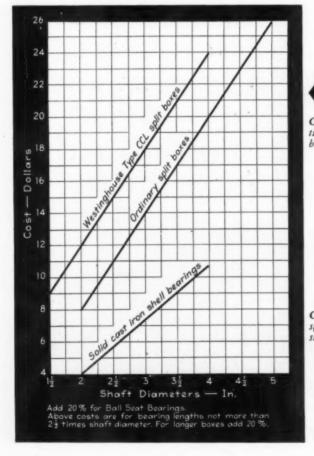
Your own experience has probably taught you how much to allow in cost for replacing bearings in motors. But, in spite of allowing what seems a reasonable cost, consideration should be given to the possibility of work on the shaft and supplying special bearings.

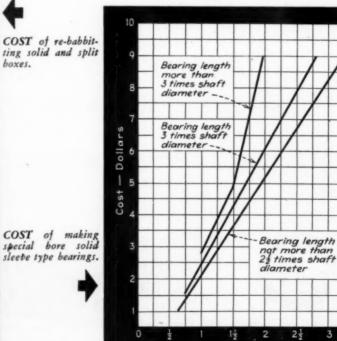
It is obvious that prices for bearings for old or obsolete motors will be relatively higher than those for current models. Since any semblance of standardization was completely absent in the older types of motors and each manufacturer followed his own dictates in bearing design, it is extremely difficult to develop any satisfactory formula on which to base a fair price for any particular bearing.

However, the accompanying charts on special bearing costs are presented for your guidance. These are based on our experience of 22 years in the manufacture of more than 2,000 different styles of bearings for over 100 different makes of motors. The charts, covering the cost of special bearings and rebabbitting, show cost in relation to the shaft size of the motor. The charts may be used as a guide to estimating the cost of doing special bearing work on the old motors which may find their way into your shop for repair.

Som

Data from Wheeler Service, Inc., Cambridge, Mass.





Electrical Contracting, May 1942

Shaft Diameters -

These Days Call for Action!



Some of the Hundreds of Appleton Types, Meeting Every Need







OUTLET AND SWITCH BOXES AND COVERS



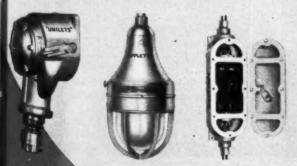
GENUINE APPLETON "UNILETS"
THREADED AND NO-THREAD CAST MALLEABLE FITTINGS







VAPORTIGHT LIGHTING FIXTURES



EXPLOSION-PROOF FITTINGS

Save Time-

Specify APPLETON— The <u>Complete</u> Line— For ALL Electrical Fittings

Appleton is the one reliable source for every kind of fitting for every electrical job. That means that when you specify Appleton fittings on your orders, you save time and energy; you get exactly the fittings you need, no matter how unusual or extensive your requirements.

The complete Appleton line helps you to standardize all your installations, promotes speedier completion of jobs and bigger net profits. It is the most complete line of fittings, boxes and connectors available from any one manufacturer.

Appleton fittings are up-tothe-minute in design and workmanship. They are constantly unde improvement, to provide bette service to builders and speedier more profitable operation for the con tractor. Bodies are sturdy, true is shape, perfectly aligned. Wireway are smooth and roomy.

From simplest outlet and switch boxes to rugged explosion-proof fit tings, the Appleton line is known fo high quality and exact conformance to all code requirements.

Safeguard your time, and conserv the time of your men! Keep every jo moving on schedule, by specifyin Appleton fittings — "STANDARI FOR BETTER WIRING."

Sold Through Wholesalers



The name "Appleton;" the registered trade-mark, "Unilets:" or the famous circle-A Appleton trade-mark shown above, appears on every Appleton fitting. We manufacture no private brand goods!

APPLETON ELECTRIC COMPANY

1704 WELLINGTON AVENUE

CHICAGO, ILLINOI

Branch Offices: NEW YORK, 76 Ninth Avenue * DETROIT, 7310 Woodwal Avenue * CLEVELAND, 1836 Euclid Avenue * SAN FRANCISCO, 655 Minr Street * ST. LOUIS, 420 Frisco Bldg. * LOS ANGELES, 100 North Santa Fe Avenue ATLANTA, 203 Luckle Street, N.W. * BRAINGHAM, 6 N. Twenty-first Stree MINNEAPOLIS, 305 Fifth Street, S. * PITTSBURGH, 418 Bessemer Bld

Resident Representatives: Baltimore, Boston, Cincinnati, Dallas, Denver, Kansas City, Milwaukee, New Haven, New Orleans, Philadelphia, Seattle

COUPLINGS, CONNECTORS (REGULAR and "LOXBOX"), ENTRANCE FITTINGS, CLAMPS











APPLETON



PERMAFLECTOR



*The silvered glass reflector with the permanent reflecting surface.

Minimum of Critical Materials Used

Combat sabotage and maintain production schedules with these new enclosed Permaflector Steel Floodlights. These units are new enclosed Fermanector Steel Floodinghis. These units are designed as illustrated above; are complete, ready to install; and consist of a spun steel case equipped with hinge and clamps, consist or a spun steel case equipped with hinge and clamps, heat-resisting cover glass, cast iron base, wire cord grip fitting, three-toot length of rubber-sheathed duplex wire, mogul socket and a Permaflector, the silver mirrored glass reflector which provides engineered light control from extreme concentration to extra broad spread. Completely weather-proof and corrosion-resistant, these floodlights are ideal for all outdoor floodlighting applications. They may be mounted on a vertical or horizontal applications. They may be mounted on a vertical or horizontal surface or attached to a pipe and adjusted to almost any position. Avoid delay, send in your inquiry or order today and obtain prompt delivery.

APPLICATIONS Air Fields **Army Posts** Factories Railroad Yards Shipyards Dams Bridges **PowerStations**

RANGE SERVICE

HANDLING

LIGHT WEIGHT - EASIER

Cat. No.	Cover Glass	Incandescent Lamp	Distribution
ST-1050	Stippled	500-300 watts	Broad
ST-1150	Stippled	500-300 watts	Narrow
ST-1010	Stippled	1000-750 watts	Broad
ST-1110	Stippled	1000-750 watts	Narrow
ST-1150-C	Clear	500-300 watts	Concentrated
ST-1110-C	Clear	1000-750 watts	Concentrated

Standard Quantity-1 Approx. Net Weight Each-35 lbs.



ST-1150-C, ST-1110-C. ddition of Stippled Cover Glass Provides Narrow

Broad Distribution of ST-1010.

PITTSBURGH REFLECTOR CO.



403 OLIVER BLDG PITTSBURGH, PA. PITTSBURGH REFLECTOR CO. EC-5-42

Estimating

[FROM PAGE 46]

ESTIMATING GUIDES

-Service and Feeders

This is the third item of the "Estimating Guides" series based on suggestions listed by the Electrical Contractors Association of the City of Chicago. Unlike the first two which were fairly generalized, this gets down to specific cases -how to take-off and list quantities for services and feeders.

The following rules are designed to systematize estimating take-off and to eliminate the inherent errors that accompany slipshod methods. If you carefully abide by these suggestions you will add system and order to your estimating routine. The rules are:

1. Draw a riser diagram (if there is none on the plans) showing service head, service feeder, service equipment, metering equipment, switchboards, main and sub-feeders, distribution panels, riser supports, conduit and cable supports. Failure to make this sketch may result in the omission of some very costly equipment.

2. Take-off and list all quantities starting at the service head and go straight through to the distribution panels for branch circuits. As you do this, check the quantities and equipment

on the riser diagram.

3. List separately, multiple runs for individual feeders. For example, if feeder No. 5 consists of three 3-in. conduits with three 500,000 c.m. cables in each, the listing should be:

Feeder 5A 1-3" cond. 3-500,000 c.m.

Feeder 5B 1-3" cond. 3-500,000 c.m

cables Feeder 5C 1-3" cond. 3-500,000 c.m.

cables 4. List the length of each conduit

run, together with the size of conduit, size and number of wires. This should be listed on the take-off sheet with notation as to what the run feeds: For example, From panel A to panel B, etc.

5. Check the total length of the individual runs against the total lineal feet of conduit.

6. Add 10 feet to the length of each feeder and multiply the sum by the number of wires in the particular conduit. The sum of these results should be approximately the same as the sum total of all the wire.

7. Re-check the list to see that the proper types of conduit and cables are noted.



Engineering and toolroom executives discuss procedure for producing intricate die from blueprinted design and specifications.



Toolroom view showing machine tools on left, diemakers' bench on right. Scene of Wiring Device die-work of the utmost exactitude.



General view, south wing of toolroom. Completely equipped with the machinery and facilities for accurate die- and tool-making.

ARROW Toolroom Equipment and Operations

Here is done the precision work responsible for the smooth working durability of ARROW Switches and wiring devices. Dependable action of finished product stems from accuracy of tools and dies. The basic ingredient in ARROW Products, — long demonstrated by Arrow performance, — suggests itself to you here. It's the ripened skill of hand, eye and craft consciousness at bench and machine.



Skilled craftsmanship, — finest tradition of the bench.

Measuring the accuracy of transfer dies to tolerance-



Battery of B & S Surface Grinders, for finishing of flat surfaces, controlled angles; also for re-dressing dies, punches, cutters.



Precision machine tooling: Surface grinding of milling machine cutters. Tolerance plus or minus "0", meaning absolute accurrey.



Bench Lathe with grinding attachment, used for turning and grinding irregular shapes; grinding small piercing punches, pilots &c.



Series of medium-size Milling Machines and Shapers, for the milling and shaping of general tools, dies, anyons and accessories.



Jig Borer, extremely accurate in laying out and aligning, in the boring and finishing of holes in gauges, in punches and dies.



tempering of dies. Charge pack hardening, waiting to be quenched.



Keller Machine: Transfers shape of master plate into die and punches and stripper. Holds the work to tolerances under .0005".



Million dollar Die Vault, storing treasure of tools and dies upon which production basically depends.

ARROW ELECTRIC DIVISION

ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN., U.S.A.

RUBBER COVERED POWER CABLES . BUILDING WIRE

It's a War of Machines!

CRESCENT



for Air, Land and Sea

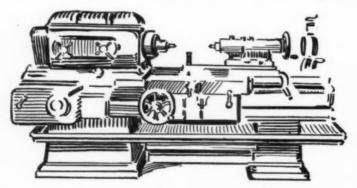
All kinds of
INSULATED
ELECTRICAL
CONDUCTORS





for all Machinery Buildings and Equipment

necessary to WIN THE WAR



War Production 100%

CRESCENT INSULATED WIRE & CABLE CO.

Ask Your Wholesaler For



Factory: TRENTON, N. J.—Stocks in Principal Cities

CRESCENT ENDURITE SUPER - AGING INSULATION

Estimating

TEROM PAGE 481

8. Pricing sheet lists should contain materials in the following order:

- (a) Service heads.
- (b) Conduit.
- (c) Elbows and couplings.
- (d) Wire and cable.
- (e) Hangers (conduit) and fastenings.
- (f) Pull boxes and cable support boxes.
- (g) Cable supports.
- (h) Grounding equipment.
- (i) Splices and cables connectors.
- (j) Fire proofing.
- (k) Excavating and cutting.
- (1) Concreting.
- (m) Sleeves and expansion joints.
- (n) Fittings and sundry items.

As the above items are listed on the pricing sheet they should be checked off on the take-off sheet.

9. Check all pricing extensions, decimal points, additions and transfer to summary sheets as outlined under *Checking Estimates* in the second item of the series on page 74 of the April issue of *Electrical Contracting*.

Once the service and feeder conduit and cables have been listed and checked, the next logical move is to consider the switchboards, panels and cabinets. Details of taking off this equipment will be discussed in the fourth item of the series.



AND PARKWAY CABLES

VERSATILE Harry Lennecke, of Reno, electrical contractor. He conducts a big business throughout that state, eastern California and even up into southern Oregon from a modest shop and showroom for appliances out in the residential district of Reno. Now he has about as many men employed on defense as non-defense business and one of the biggest contractor payrolls in the state.

SERVICE ENTRANCE

SHEATHED CABLE



Profit by telling your customers about Teletalk

"We consider Teletalk indispensable." Again and again these words occur in letters from Teletalk users. They testify to the time and energy Teletalk saves... the proved merit of Teletalk as a means of getting things done faster.

The productive time that Teletalk Amplified Intercommunication can save your customers who are producing for war and essential civilian needs is a profit opportunity for you—and it is more than that. It is an opportunity to serve your customers extremely well . . . to help

them find a source of the most important raw material of all—extra hours in every working day. Demonstrate Teletalk. Its time-saving advantages, attractive appearance, and quality construction become apparent when you show Teletalk "in person." You can offer models and special features to meet every intercommunication need. You can assure your customers of quick installation, low operating cost, and years of satisfactory service.

If you are not already familiar with

Teletalk, the nearest Teletalk distributor can give you the facts promptly. Or write direct for information.

Licensed under U. S. Palents of Western Electric Company, Incorporated, and American Telephone and Telegraph Company.

WEBSTER ELECTRIC COMPANY Racine, Wis., U. S. A. Established 1909. Export Department: 100 Varick St., N. Y. C. Cable Address: "ARLAB" New York City



WEBSTER



ELECTRIC

"Where Quality is a Responsibility and Fair Dealing an Obligation"



Answered by
F. N. M. SQUIRES
Chief Inspector New York Board of Fire Underwriters

Bare Neutral

"I am putting in an ornamental lamp post in a back yard, to be controlled from the house and the garage. I have a piece of duplex lead cable which I could use for the 3-way switches, the lead covering for the neutral because I'll bury the cable in the earth. Does this sound all right?"—P. L. J.

No. The Code does not recognize uninsulated neutrals except in some services. See Section 2304. Just note how the neutral is at ground potential on one side only of the lamp post. Imagine what would happen if you were to use a metal lamp post with that hot wire inside of it. Bare neutrals have been proposed but even then the stipulations were that such neutrals would be contained within well-grounded conduits.

Two-Phase Switches

Why does our engineer rule that the Code will not allow the use of a 100 ampere switch to carry the following 440-volt, 2-phase load, five 3 hp., three 7½ hp. and one 10 hp. motors? The sum of the motor ratings comes to 61 amperes."—G. M. T.

A • We would refer to table 23 on page 322 wherein the footnote may provide the answer.

We may assume the largest motor draws 12 amperes, so taking 300 per cent of this for full-voltage starting as per table 27 gives 36 amperes. This added to the sum of the remaining motors or 49 amperes, gives 85 amperes as the required rating of feeder fuse. However, the two-phase systems results in a current of 1.41 times 85, or 120 amperes in the common conductor. Therefore a 200 ampere switch is required.

F. N. M. Squires, who regularly conducts this department, was injured in an automobile accident in April and John M. Turnbull of Springfield, Mass., answered your Code questions in this issue.

Use of Green Conductor

"A moving tool platform on one of our machines was fed through a 4-conductor rubber cord with one conductor identified by green insulation used as a ground from the motor to the conduit system. To provide additional protection from hot metal chips flying off the tool we enclosed the cord in flexible conduit.

Would it be permissible now to disconnect the green conductor and use it for a control wire to actuate a warning light in the adjoining aisle?"—A.N.P.



OLD TIMERS discuss the past and the days of the automatic controlled gaslight. Fond memories are cherished by H. A. Holden, H. A. Holden Co., Minneapolis, (left), O. A. Frykman, Chief Electrical Inspector of City of Minneapolis and Edw. M. Raetz, Rochester, Minn., retiring president of the Minnesota Electrical Association.

Official Interpretation No. 152

answered this question. Section
4014, with its footnote, also furnishes an
explanation of this rule.

The official interpretation was as follows: Question—Some flexible cords have one insulated conductor with a green color in its individual covering. May such a cord be used where grounding of portable equipment is not involved and the conductor with the green color in its individual outer finish is not a grounded conductor?

Finding-Yes.

Referring to the footnote, provided that no conductor of the cord is used as a grounding conductor, then the green colored conductor could be used as contemplated for another purpose.

Of course, this answer assumes that the flexible conduit does provide a proper grounding connection for the tool plat-

form.

Grounding Hoist Lights

"A hand operated hoist with the beam rotating through a quarter circle arc has two lighting units wired in conduit with threaded fittings mounted below the beam. A super service cord connects to an outlet on an adjoining column. Is it necessary to provide a grounding conductor in the connecting cord? The entire assembly is securely fastened to a building column."—H.P.A.

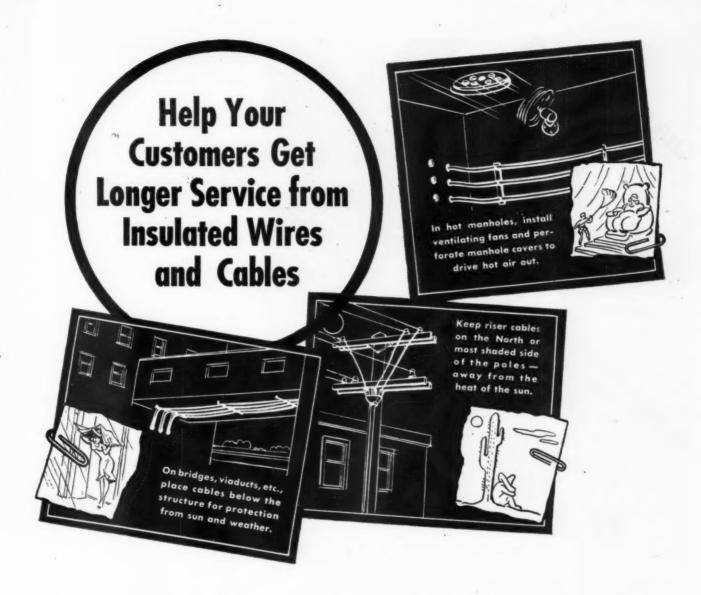
A The hazard of operating such a hoist in a conductive location, such as a foundry, seems to outweigh all considerations of whether or not to bond the hoisting assembly to the building column. By bonding the hoist to the building steel, all shock or accident hazard to the operators will be removed.

Section 2557 states that "Electric equipment secured to and in contact with the grounded structural metal frame of a building, shall be deemed to be grounded." Note that this refers to "Electric equipment" secured (directly) to and in contact with the framework of the building.

Specifically answering the detailed question, if we consider the conduit as fixed equipment, then sections 2555 and 2556 apply, giving a choice of grounding conductors to be employed.

Transformer Fusing

Statement—A 37½ kva. transformer supplies an elevator load. The switch on the primary or 220-volt side has 200 ampere fuses which blow too often. The 440-volt motor side has 350 ampere fuses



Recommend These Ideas Whenever Possible

Electrical wires and cables operate more efficiently by reducing the temperature of the surrounding air (ambient temperature). A lower temperature makes insulation last longer with the same conductor loads . . . or more current can be carried on the same cable without shortening its life.

By making the most of wires and

cables—copper, rubber, lead and other essential war materials are saved. Call on Hazard Engineers for assistance in determining the most efficient way to install, operate and maintain electrical circuits.

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE COMPANY
Works: Wilkes-Barre, Pennsylvania
Offices in Principal Cities



INSULATED WIRES
AND CABLES





- Extra strong, with larger body and setscrew
- Completely nonmetallic - no taping
- Installed with ordinary screw driver
- Color coded, for easy identification of connections
- Made entirely of tough, durable Plastic

Here is the newest, most improved Fixture Connector on the market. It's made of tough, durable PLASTIC that will stand a lot of abuse. It has an ample size body and set screw. It's installed with a screw driver-no special tools. And it's completely nonmetallic-needs no taping.

This Sherman Plastic Connector is the only non-metallic Fixture Connector using a positive set screw for securely holding the wires in contact. It won't jar or shake loose. No return trips to repair blackouts. And it's color coded so that you can identify the connections after they are made.

Regularly packed 100 in carton, all one color. May also be bought in bulk lots, assorted, or all one color.

Ask your Sherman jobber about this -or write us direct for samples.

H.B.SHERMAN MFG.CO. Battle Creek, Mich.

herman ELECTRICAL FITTINGS



IEROM PAGE 523

on a 500,000 cm service, also 70 ampere fuses on the two elevators.

"What should I do? Cut down on the 350 ampere fuses or step up the 200 ampere fuses which give the trouble? What does the Code allow?"-J. M. C.

The transformer is good for 98 A. amperes so is correctly fused in accordance with 4531 which rules that the primary may be fused at 200 per cent of rating. The 350 ampere protection on the 500,000 cm service is o.k.

Supposedly the elevators come on together at times and overload the 200 ampere fuses. Why not go to time-lag fuses provided the conditions of 4347 as to maintenance can be met? Time-lag fuses will carry you over the starting bump and still provide good protection for the transformer.

Floor Outlet

"Please state the place in the National Electrical Code where it says that a plug outlet in the floor must not be reckoned as one of the 20foot outlets?"-H. J. P.

Our reader refers to section 2110 governing the number of receptacle outlets, but this has been explained in Official Interpretation No. 188 that the intent is that receptacle outlets shall be placed at the borders of rooms in or above the baseboard. Floor receptacles to be counted in the total of the required number shall be located close to the walls.



INDIVIDUAL INITIATIVE and ingenuity of industry to find its place in the war effort, was the plea of W. H. Wheeler, Chief, Contract Distribution Division, WPB, Washington, D. C., as he addressed the Edison Electric Institute Power Conference at Chicago.



YOU'LL FEEL BETTER

when you know that your plant and production are guarded by



SHAWMUT SHURLAG RENEWABLE FUSES

because at last you'll be rid of needless shutdowns and delays from inefficient fusing. Nearly half a century of superior engineering skill and manufacturing craftsmanship, devoted exclusively to the making of electrical protective devices, stands behind SHUR-LAG fuses. Now as ever, they are the simplest, sturdiest, most serviceable time-lag fuses you can buy, and the easiest and quickest to renew. Don't take chances, ask your dealer today about SHAWMUT SHUR-LAG FUSES or write for our Bulletin 400.



THE CHASE-SHAWMUT COMPANY NEWBURYPORT, MASSACHUSETTS

FUSE MAKERS SINCE 1893



E American production holds the final key to victory.

Maximum production means good lamps and lots of them.

The makers of Champion Lamps are proud to contribute the entire skill, experience and resources of one of the country's largest organizations of specialists in fine lamp manufacture to the end that American Industry may be supplied with good, dependable lamps at lowest possible cost using the minimum amount of critically needed materials.

The distributor of Champion Lamps nearest you is equally prepared to do his part toward helping you to achieve the common objective.

If you're not already in touch with him may we give you his name?

CHAMPION LAMP WORKS Lynn, Massachusetts A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO.

Champion Lamps are licensed under General Electric Co. incandescent and fluorescent lamp patents

More Gossip

Contractors Meet at Sleepy Eye, Minn.

Sleepy Eye, Minn., was the scene of one of a series of informational meetings that will be held from time to time in various areas of Minnesota. A large number of rural electrical contractors gathered on March 25, 1942 to learn about priorities and emergency regulations. Also present were Wm. A. Ritt secretary-manager, Minnesota Electrical Council and George Garney of the State Board of Electricity.



CONTRACTOR LEADERS in Indianapolis, Ind., are Harry W. Claffey (left) and Charles D. Coonce, chairman and vice-chairman, respectively, of the Contractor Division, Electric League of Indianapolis, Inc. Mr. Claffey is vice-pressident of the Sanborn Electric Co., and Mr. Coonce has his own contracting business.

Fined for Illegal Wiring

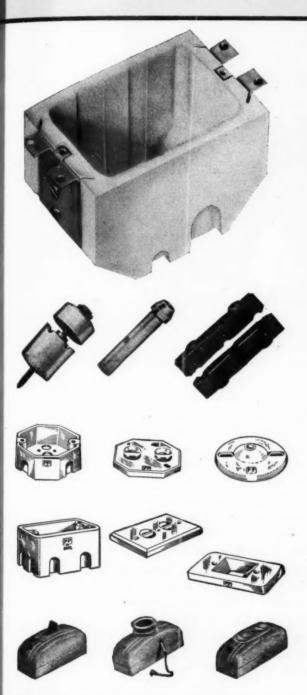
The teeth in the Minnesota State Electrical Licensing Law nipped two Lewiston, Minnesota, electricians to the tune of ten dollars each. The men were arrested in Warren Township and charged with installing electrical wiring in a residence, without being licensed. When they pleaded guilty, Judge E. D. Libera, fined them.

The action was instigated by the Minnesota State Board of Electricity, policing medium for the contractor licensing law.

Study Repair Technique

Motor repairmen throughout the North Central area attended a one day meeting on April 11 at the Chamber of Commerce Building, Minneapolis, Minn. The session, sponsored by the H. A. Holden Company of that city, was devoted to a discussion of motor repair technique and shop practice. Representatives of the Helwig Company and the Essex Wire Corporation assisted in conducting the school.

Here's what you MUST CLANT USE



These materials for Porcelain Protected wiring systems—Porcelain outlet boxes, knobs, tubes, cleats and Surfolets—will help win this war thru conservation of critical materials. Place an order for your requirements today!

for Army and Navy Building Construction —Defense Housing



WAR DEPARTMENT, CORPS OF ENGINEERS, CIRCULAR LETTER #1245—Jobbers and Electrical Contractors should be acquainted with the important contents of this letter. This letter has been issued to insure adequate supplies of materials for national defense requirements. Items containing critical materials will be eliminated, and even the these critical materials are available substitutions will be made to effoct conservation. Metallic wiring is prohibited wherever possible. For items specifying the use of PORCELAIN see page 22 (item 23); page 31 (items 10 and 11); page 32 (item 23).

ARMY AND NAVY MUNITIONS BOARD LETTER—This letter accompanied a List of Prohibited Items for Construction Work. The use of this list is mandatory for projects rated on and after April 5, 1942 and all Jobbers and Electrical Contractors should be acquainted with its contents. For specification concerning the use of PORCELAIN (non-metallic outlet boxes) see page 8 (item 9) of the Prohibited List.

DEFENSE HOUSING CRITICAL LIST—Every Jobber supplying materials and every Electrical Contractor working on Defense Housing should have this important list. Only the materials and products included in this list are eligible for procurement by the extension of a Preference Rating order. PORCELAIN (non-metallic outlet boxes) are listed on page 19 (item 341) and Porcelain Protected Wiring (insulated single conductors) on page 18, (item 332).

During this crisis the Nation has, as in World War I, again called on Porcelain Protected Wiring (Knob and Tube) to carry a tremendously increased electrical load. This is outstanding evidence of the faith placed in and the great need for this simplest and most efficient of all wiring methods with its record of more than 50 years of proven, reliable service. It is highly essential that this type of wiring construction be used for Defense Housing. Cantonment construction and all other types of government sponsored and private building construction. During 1942 it can save an estimated 184,020,000 lbs. of Steel; 22,236,000 lbs. of Copper; 2,964,000 lbs. of Rubber; and 1,488,000 lbs. of Zinc.

"Porcelain Saves Critical Materials"

PORCELAIN PRODUCTS, INC.

FINDLAY, OHIO



The new Westinghouse QUICKLAG Panelboard has what we call "judgment" —good "common sense." Like all Westinghouse "De-ion" lighting panelboards, each breaker can tell the difference between a momentary, harmless overload and a positive short circuit—but the Quicklag reacts to a short circuit FASTER!

Two other Westinghouse panelboards featuring Type AB "De-ion" breakers

LOW-CAPACITY DISTRIBUTION PANEL-BOARD—designed for low capacity power and lighting applications having branch circuits not exceeding 50 amperes each. For 230-volt A-C systems.

CONVERTIBLE TYPE
—for distribution of
light and power service,
15 to 600 amperes. For
250-volt systems, A-C or
D-C, and 600-volt A-C
systems. Permits maximum convertibility.





It's "quick!" When a short circuit occurs magnetic trip action alone actuates the breaker.

It "lags!" On harmless momentary current overloads, such as motor starting, the Bi-metal protection prevents unnecessary service interruptions. But if the overload continues past a safe point, the circuit is promptly interrupted.

This new Westinghouse development is known as co-operative thermal-magnetic trip action. But when you specify, just say "Quicklag." You'll be assured of maximum protection for lighting and appliance circuits without needless interruptions and resettings. There's a Westinghouse Agent near you. Call on him for help in your circuit protection problems. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

Westinghouse



NOFUZE CIRCUIT PROTECTION

dustrial fication QUALITY ONE of the most spectacular industrial developments of recent years is the rigid control of product quality through automatic control. And in each step of the process which contributes to the perfection of the finished product electrical control is prominent. From raw material to finished goods in making food products or G-INSTALLATION - MAINTENANCE

ELECTRICAL AIDS TO OUALITY CONTROL

can aid the pursuit of perfection in quality manufacturing from the entry of the raw material to the delivery of the finished product. The application of these controls through the understanding cooperation of the electrical departments is the subject of this article.

The attainment of a satisfactory manufacturing standard of perfection requires inspection and control during each step through the plant. Any inferior unit which is allowed to pass means scrapping after additional work has been done, or selling as an inferior grade, or rejection by the customer. Any of these results means loss in profits and in critically important materials.

Consider the several typical steps in a manufacturing process. At each step there are usually many means whereby quality can be controlled electrically.

(a) Receiving and inspection of raw material.

(b) Storing and handling raw material, work in process, and the finished product.

(c) Process operations.

(d) Inspection during and following processes.

(e) Recording of conditions during processing.

(f) Packing, storing and shipping finished product.

Receiving and Inspection

Control of quality and economy of plant operation begin in the receiving room. Ascertaining quantities of materials purchased may involve counting many units, weighing many shipping

LECTRICAL control units have and packages or much bulk materials. Electric counters using an electric eye give a quick and accurate record of the number of units passing a given point. Packages may be weighed while traveling on a conveyor, and the weight relayed to a recording instrument located some distance away. Bulk articles can be weighed while being conveyed to their storage bins. The electric eye, in addition to counting the number of units, may be utilized to throw out sub-standard units based on color.

An electro-magnetic pulley to remove tramp iron from bulk materials is common practice for the accidental inclusion of iron is quite general. This holds the iron for delivery at a point past that where the bulk material is discharged. Similarly, an electro-magnet will remove iron and magnetic particles from liquids passing over it, or such a unit



MAGNETIC DUST spots hidden flaws at Curiiss-Wright. The part to be in-spected is magnetized and sprayed with iron powder. Lines of powder thus formed will detect cracks as much as 2 inches under the surface or surface cracks only 0.0002 in. deep.

Previous articles covered-

From raw material to finished goods, in making food products or building naval guns, electrical handling, inspecting, recording, and control devices add safety, precision and speed to the skills of trained men and the plans of management. The responsibility for senting the skills of the skills of trained men and the plans of management.

lecting, adapting and maintaining electrical aids to quality rests with

electrical aids to quality rests with
the electrical department.
In converting plants to war production and in speeding existing
processes to relieve short-handed
departments, electrical equipment
can often open bottlenecks, cut
spoilage and insure safety to operator and machine.
Use the check list accompanying
the article beginning on this page
as a guide to quality control methods adaptable to processes in your
plant.

1. Simplifying Electrical Mainte-

nance
2. Preventive Maintenance of Dis-

tribution Systems
3. Preventive Maintenance of

3. Preventive Maintenance of Electrical Equipment 4. Reducing Power Costs 5. Maintaining Good Power Fac-tor—Part I

6. Maintaining Good Power Fac-tor-Part II

7. Meeting Severe Service Conditions

8. Eliminating Causes of Severe Service Conditions
9. Providing Adequate Capacity for Increased Demand

10. Electrifying Operations to Reduce Unit Costs 11. Safety Protection for Electrical

Operations
12. Increasing Flexibility of Electri-

13. Electrical Aids to Automatic
Control

14. Electrical Ways to Reduce

Waste
15. How to Save Power
16. Protection Against Sabotage
17. Improving Working Conditions
18. Electrifying for Continuous Op-

eration

19. Electrified Plant Housekeeping 20. Electrical Problems Under 168 Hour Schedules

21. Electrical Aids to Plant Con-22. Electrical Aids to Quality Control (this issue)

Future articles will discuss-

23. Factory Codes 24. Welding in Industry

will remove magnetic particles from materials while it is being screened. Not so well known is the magnetic analyzer: an instrument for determining the percentage of iron in such materials as asbestos, mica, glass sand, paper pulp, and the like prior to processing.

All electro-magnetic devices depend upon windings which are subject to minor shorts which reduce the "pull" without noticeable external effects. Regular tests should be made for leakage between coils or to ground, for otherwise, iron may go through to cause trouble.

Storing and Handling

Mishandling of materials within the plant frequently causes damage and loss. Damage caused by faulty electrical controls on cranes, hoists, elevators, elevating trucks, stackers, and so on, may be, but seldom are, charged to the electrical maintenance force. If the controller contacts and fingers are burned off or damaged, the operator may be unable to control his equipment smoothly and the resultant jars crack, distort or dent fragile parts. Faulty electric brake action on a hoist similarly may cause a damaging jolt to some sub-assembly, the effect of which may not be noted before reaching the customer's plant.

Such accidents can be prevented by frequent inspections and conditioning of the electrical devices involved. Smooth operation of hoisting, lowering and transfer functions of material handling equipment can be expected only when such devices are properly maintained.

Magnetic devices depend upon windings which are subject to minor shorts which reduce the "pull" without noticeable external effects. Regular tests should be made for leakage between coils or to ground, otherwise iron will go through to cause trouble.

Mishandling of material sometimes occurs through faulty operation of cranes, hoists, elevating trucks, stackers and the like because of bad condition of controller contacts and fingers. Fragile parts may be cracked or other materials dented or distorted during storing or reclaiming operations, later to introduce an inferiority factor in the final assembly.

Smooth operation of hoisting, lowering and transfer functions of material handling equipment can be expected only where such devices are properly maintained and cared for.

As the product advances toward completion the parts become more and more vulnerable. Many items are harmed by oil stains and grease spots. Motors, transformers, circuit breakers and the like that use grease or oil should be kept in a condition that precludes any damage to stocks of material that may be exposed. This applies also to goods on the floor below. Oil overflow from motors will go through a floor as is well known in textile mills.

Process Operations

Process operations are so widely varied that only a few typical classes can be discussed here. Electrical variables that affect them are voltage and frequency together with the condition of electrical equipment. Frequency variations are not likely to occur in plants operating on purchased power. Plant generated power, lacking the steadying effect of a large system, is subject to frequent swings in frequency. Direct current is subject to voltage variation at the source, whether the generator is driven by a prime mover or by a synchronous motor. Furthermore, where lines are long, voltage may be unsteady at motor terminals even if it is stable at the source.

Every effort should be made to keep frequency and voltage up to normal for the following reasons:

Fuel, such as pulverized coal, high pressure primary air and low pressure secondary air are fed to kiln burning processes. Often the fuel is fed by adjustable speed d.c. motors and the air by a.c. motors. Voltage changes affect the feed and frequency changes affect the air. Further, the kiln may be rotated by d.c. or a.c. motors and any change in speed alters the time the material is exposed to the heat.

Where dry material is fed into a mixture in process, d.c. motors are most often used. Speed adjustments are infrequent. Speed changes can creep in because of voltage variations or because of motor trouble. Corrosion or loosening of field connections will cause the motor to speed up. Incipient grounds or shorts in the commutator or armature windings will cause the motor to slow down. Unless detected by an authorized person a great quantity of product may be off grade or spoiled.

Time in process often depends on motor speed, as in the kiln example. Speed may be critical as in the following operations.

Heat treating may use a conveyor which moves metal through zones of heat. Precise time in the furnace or oven determines the quality. While a.c. motors are often used, even they are subject to unplanned speed changes, especially wound-rotor motors.

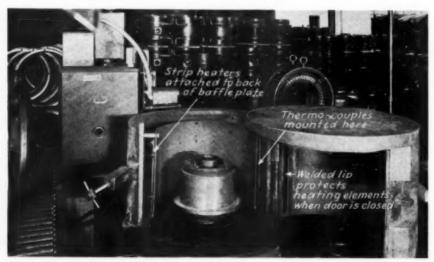
Textiles, paper, steel, rubber and the like are treated with acids, caustics or bare gas flame. Time in process must be uniform to assure uniform results. Many such processes are carried out in range drives in which speeds must be held in close relation on a number of units in sequence. Such ranges (or whatever they may be called in the various industries) require more than ordinary care of control equipment. Defective control will introduce variable speed or variable tension even if other elements are up to par.

Stoppages

Unplanned stoppages are to blame for considerable off-quality production. Material going through during the slow down to a stop and again while getting back up to speed must be "cropped" or disposed of in some way as being defective.

The frequency of such stoppages is a measure of the electrical man's ability and diligence whether a general power failure is the cause or a single motor or control device goes out.

Stoppages are serious in some industries. In cutting marine propulsion gears, continuous operation is imperative. An auxiliary battery source of



INGENIOUS APPLICATION of a thermo-couple and thermostat connected to eight 500-watt strip heaters gives close control in "seasoning" commutators at Reliance Electric & Engineering Co.

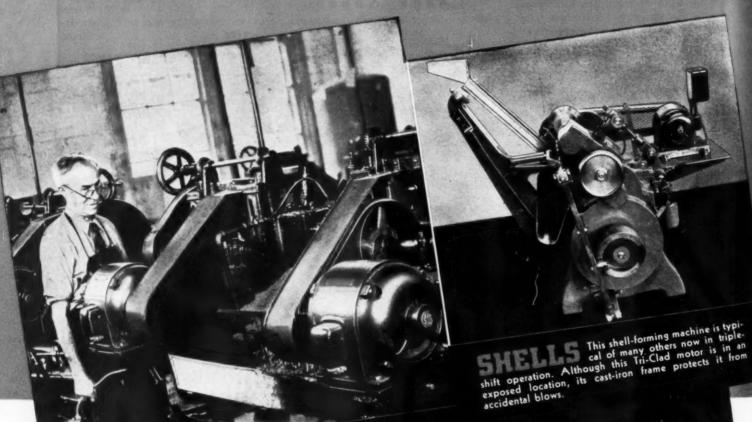
MAINTENANCE GUIDE SHEET

ELECTRICAL AIDS TO QUALITY CONTROL

Check Sheet

PURPOSE	OF CONTROL	PERFORMANCE	PURPOSE	OF CONTROL	PERFORMANCE
To control humidity in enclosed areas	Humidistat	Operate relay o intro- duce moisture or op- erate dehydrating units. For close control, an anticipating instrument	Timed operations and sequences	Electric timers based upon fre- quency	Are as accurate as the frequency of the supply
	must be used.	1	Electronic relays	Control short cycle op erations to small fractions of seconds.	
To control tempera- tures	Thermostat pyrometer	Operate relays which control heating or cooling units. Anticipating units available for close control.	Synchronized operations	A. C. frequency	Motors of same characteristics will operate same speed. Synchro nous motors needed in some cases. Synchro
To count items with- Electric eye out mechanical contact	Electric eye	High Speed, accurate counting of single units —must have good voltage control and be kept		D. C. voltage	nizers avilable for othe units. D. C. motors must have
	in condition.		•	uniform voltage and consistent loads.	
To detect color variations, off-standard units, punctures, etc.	Electric eye	Operate a relay in- stantly and accurately indicating or removing inferior items.	To prevent injury to product or equipment	Dynamic braking	Almost instantaneous stoppage.
To detect flaws in metals	X-Ray	Accurate for flaws not evident on the surface.		Limit switches	To prevent overrung control storage of supplies.
To locate hair cracks	Magnetic flux and iron filings	Makes thin cracks visible to inspector.		Electric eye	To stop production upon inclusion o foreign materials may control dynamic braking.
To remove metallic substances from loose material	Magnetic pulley	Remove tramp iron by holding for delayed de- livery.	To prevent complete plant stoppage on overload	Load limit- ing devices	To cut off unessentia load.
To determine per- centage of iron in loose material	Magnetic analyzer	Accurate to close limits by effect on magnetic field.		Overload relays	Drops load to preven damage to supply equipment.
To minimize break- age in handling — sistance con- elevators, cranes, hoists, lift trucks, stackers, etc.	sistance con-	Smooth operation when number of steps are adequate and contacts in good condition.	To prevent equip- ment from running backward	Reverse flow relays	Stops motor if rotation i wrong—prevents gen erator feedback.
	3000 condition.	To insure good vision for production and inspection	Sight meters	Demonstrates lighting levels.	
Auto transformers Variable voltage with d.c.		Smooth operation with sufficient taps and good contactors.	To record operations	Graphic meters	Available in extreme variety for many applications. Recorpower, speed, tempera
	tage with d.c.	Very smooth operation but requires more equipment.			ture, time, voltage humidity, power factor etc.

triple-shift TMIPLE operation TRIPLE calls for TRIPLE



Greater fire power for democracy grows out of sure-fire motor performance on machines like this. Note how the motor performance guards the motor from chips and coolants.



Time is short but Tri-Clad motors are quickly installed as well as easily maintained on new machines or old. In this arms plant, Tri-Clad motors furnish smooth driving power to a line of milling machines.

This hand-milling machine—in an Eastern aircraft plant—is driven an Eastern aircraft plant—is driven. The light weight, compact. The light weight, compaction of this motor make it an excellent choice for machines like this.

and the EXTRA-PROTECTION Features* of TRI/CLAD Motors



Will Help You Get "All-out" Production

> HE extra-protection features of the Tri-Clad motor reduce the possibility of interruptions due to motor failure. Chips and coolants are kept out. The stator winding, of Formex wire, is well-nigh impervious to oil, moisture, and heat shock. Improved bearings contribute greatly to sustained operation even under difficult conditions. And besides, Tri-Clad motors are easy to install and convenient to lubricate.

Why not give your vital war production an extra measure of protection? Make sure your next motors are Tri-Clad motors. General Electric, Schenectady, N. Y.

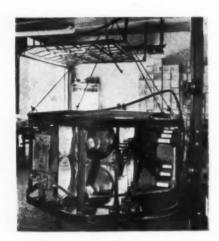
*Extra protection against physical damage, electrical breakdown, and operating wear and tear.



General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

GENERAL & ELECTRIC





SMART APPLICATION of infra-red heat to insure even quality of finishes on gusber coolant pumps at The Ruthman Machinery Co., Cincinnati. The "oven" is raised up and down on counter balances.

power is provided and automatic throw over takes place if normal power fails. Glass plants usually receive power from two lines because loss of power means loss of production over a long period while working back up to quality production.

The throw-over device should be operated frequently to keep it in order. In the author's experience, a case developed where the throw-over failed to function because of an accumulation of dust, grit and oil film on contact surfaces. It had not been operated in the previous six months.

Means Available

Regulators are made for a wide range of functions such as speed, voltage, load, frequency, etc. They are not very expensive and can be installed readily. They can operate only within narrow limits and if the regulated characteristic goes beyond the regulator range it becomes ineffective.

Voltage fluctuations in a.c. lines that affect wound-rotor motor speeds and heat in furnaces and ovens is often caused by low power factor. A survey of its causes will bring forth means for improving power-factor. Capacitors are most often used after plant readjustments have been made and improvement is still needed. The new types with noninflammable dielectric may be installed anywhere in a plant without vaults or long runs of cable.

Portable or permanently installed indicating or recording instruments will provide information that will tie-in with periods of poor quality production. Charts from recording instruments are especially effective in bringing conditions to the attention of the management in order to get the needed equipment. Parallel column two-line instruments are available which record two

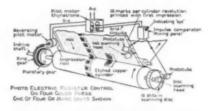
functions side by side so there can be no question of relationship. Such instruments are used on temperaturespeed, volts-amperes, power factor-voltage and in other combinations.

The timing relay, an inexpensive package of simple electronic and magnetic devices, is used for the precise timing of operations where time is important in quality control. They are applied on heat and pressure treatments, grinding and honing operations, chucking and machining, operating solenoid valves in liquid or gas lines and for many other purposes. They relieve operators from tedious and boring timing or counting and by the elimination of the human factor another variable is thrown out.

Electrical men should familiarize themselves with all such aids, find where they apply in the plant and then recommend their use.

Inspection

Quality check up to be ideal should be continuous and far enough back in the process to make correction possible without loss of production. Under this class are the continuous strip steel thickness



APPLICATION DETAILS for electric eye control of register on four-color rotogravure press. The first installation made early in 1941 paid for itself in one year.

gage, automatic width gage, photoelectric pyrometer, photoelectric side register, web register and color register devices. A unit is available for continuously reading the stray metal content in a product, others read moisture content, compare color, etc. Most of these devices have now been developed for control as well as inspection; in other words, when the quality deviates, a correction is made so that the final output is uniform.

In most inspection operations the highest class of lighting is essential or another variable is introduced. Full voltage, steady voltage, cleanliness and frequent renewals will aid inspectors to see the same quality in the same way every time.

The lighting equipment used should provide not only adequate intensity but should be chosen for the characteristics of the inspection job. Large shiny metal surfaces should be examined under large sources of low brightness, the so-called sky light effect. Small intense sources are often useless as the glare from the surface blinds the inspector to all but the most conspicuous defects. Other processes can be inspected by trans-illumination, viewing the product against a controlled light source.

After the product has left the last process and has passed inspection, there remains some chances for deterioration before it goes to the consumer. electrical man can instigate some of these hazards. As described under receiving and storing, faulty handling should be reduced to that chargeable only to the man and every precaution should be taken to limit human errors. A large device which was to function by weighing the difference between air and an air-gas mixture was dropped a few inches. It was shipped, failed to function properly, necessitated field trips, return to factory, delay for customer and loss of good will.

Where goods are packed, lighting should be high-quality, nearly as good as for inspection. If electrical devices are used, such as photoelectric counters, hot plate sealers and the like, it is in the electrical man's field to see that they operate properly. Both care of devices and the maintenance of steady power supply are involved.

Storage may require air conditioning as to temperature and humidity. Records should be kept of these conditions so that any tendency to go off standard can be detected and corrected before any harm can come to the goods in storage.

In general, the instructions furnished by the manufacturers for the proper care of electrical equipment should be studied with quality production in mind. Concentration on the things that can cause deviations from uniform service will go far toward eliminating the variables that work against ideal production.



CASTINGS are X-rayed from all angles at Bell Aircraft's laboratory. Defects sought may be thin cracks, gas pockets, or small areas where the alloying elements are unevenly distributed. The films are then examined with very sensitive optical instruments.

Quietly and Unseen -* Thousands of CENTURY MOTORS



He's in a tough spot, too....

BUT NEVER TOO TOUGH TO HELP YOU

If you think that you're hard hit by electrical supply shortages, consider your Republic ELECTRUNITE STEELTUBES Distributor.

It's his job to stock and deliver the raceway, fittings, wire, fixtures and other materials you need. He has built a business, invested his money and trained an organization to do it. He has always said "Yes" to your demands for electrical supplies. But now, due to the needs of *Production for Victory* he may have been forced to say, "No, you can't have that much material" to some of his best friends.

Yet he knows his customers are depending on him. He feels that he *must* come through—some way. And when a man with that attitude is plugging for you, results are more likely to follow.

Tough as his position is, he's still getting results in

meeting emergencies. He usually can deliver from stock the materials needed for small jobs—or can obtain enough to begin work promptly on wiring installations needed to speed up our war effort. He'll do everything possible to help you "lay out" and estimate jobs, then keep them moving on schedule. See your ELECTRUNITE STEELTUBES Distributor first. To speed up delivery, always be sure to give him complete details with every order—including preference rating certificate or extension. He must have this to replenish his stock. The manufacturer needs it to secure the material from which to fabricate the electrical supplies you will need in the future.

STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
CLEVELAND OHIO

Berger Manufacturing Division • Niles Steel Products Division Union Drawn Steel Division • Culvert Division • Truscon Steel Company

NOW'S THE TIME TO LEARN ABOUT "Inch-Marked" ELECTRUNITE STEELTUBES

If you're looking for ways and means to speed Construction for Victory, don't overlook "Inch-Marked" ELECTRUNITE STEELTUBES. This streamlined rigid steel raceway is already marked off in feet and inches (just like a foot-rule) along each length of tubing. A patented knurled inside surface makes wire pulling as much as 30% easier. Two simple compression-type fittings eliminate dirty, tedious thread cutting. The tubing is light in weight and easy to handle. The ELECTRUNITE Bender makes bending by hand easier and more accurate than ever before. The bending instruction tag provides simple directions for making various bends. It's the tubing that has been called "the easiest-to-use rigid steel raceway in the world."

Republic

INCH-MARKED

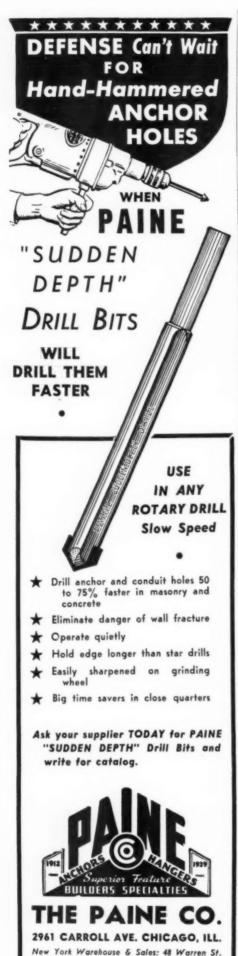
THE ELECTRICAL RACEWAY WITH



LECTRUNITE Steeltubes

TINUOUS FOOT-RULE ON EVERY LENGTH!

Electrical Contracting, May 1942



Flexible Electrical Service

The structure built for The Standard Register Company at Dayton has many unusual features. All service lines are carried in floor trenches underneath the cast steel floor plates visible here. Unobstructed monitor aisles 60 ft. wide provide maximum flexibility in the press shop. Ventilation is provided through openings in continuous wall sash which surrounds the building and



IDEAL SERVICE FACILITIES, with plenty of elbow room increase flexibility of this new building

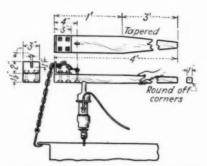
continuous roof ventilators extending the full length of each monitor at peak of roof.

Ideal light conditions are supplemented by combination mercury vapor and mazda units, providing light of 20 foot-candle intensity throughout the plant, which is face to face with 24-hour operation. Expansion of equipment can come at any time as facilities are available for immediate use.

Versatile "Oldman"

Drilling holes in machinery or building steel work can be a tedious and laborious job if one stays at it for a prolonged period. Unless one is aided by a helper or some device to relieve the muscle straining effort of forcing the bit forward by sheer brute force sore arms and back are the inevitable result. And for no good cause since a simply constructed brace or "old man" as the device has become generally nicknamed eliminates the drudgery and speeds up the work as well. Ofttimes with the aid of the "old man" one man can accomplish as much as two did formerly, and with less exertion.

While there are numerous models existent that indicate the user's need for some peculiar model best suited to his particular work, the model pictured here is probably as universal in application as any two or three or others combined. The stock or handle built by the plant



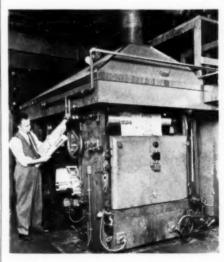
DRILL BRACE takes the hard labor out of drilling steel work by means of a lever arm and chain.

carpenter from a good grade of hardwood is tapered down from 3-in. in the large end, to 1-in. in the smaller. A section of 2-in. by 3-in. angle iron is drilled for four 16-in. carriage bolts which fasten the iron to the stock. This angle iron is slotted to receive the links of a 5-in. chain whose free end is equipped with a hook while the other end is fixed to the stock by a screw eye or eye bolt. In practice the drill is set up on the work, the hook is engaged under any convenient projection or in a bolt hole and the chain is hauled tight and dropped into the slotted angle iron. Then with the stock forcing down on the motor, power is applied and the hole is drilled easily.

Electric Heat Solves Problem

Applying cellulose acetate to paper is an operation which must take place at carefully controlled temperatures. This thermoplastic, known as Liquafilm, is used on labels, magazine covers, packages, and candy box covers.

After several attempts to find a suitable heating medium, the Standard



ELECTRIC HEAT all the way—a total of 19.75 kw. at work, to keep the thermoplastic solution at precise temperatures. View shows cook book covers being processed. (G.E. photo)

Process Company of Chicago found that electric heat, thermostatically controlled, was the most suitable for applying the thermoplastic solution.

The cellulose acetate is applied at a temperature of 280 F. It is first heated to 275 F. in a tank equipped with six 1,000 watt and seven 500-watt G. E. calrod heaters. The thermoplastic is then transferred to another tank for the final heating. The second tank is equipped with seven 500-watt heaters. Incidentally both tanks are at the bottom of the processing tank.

The coating is applied as the paper enters the machine, by a roll which is kept warm by a 250-watt heater. A blade warmed by a 500-watt heater "doctors" the roll. The paper is then contacted by two smoothing and glazing blades, each heated by a 3,000 watt heater.

Electric Eyes Control Calibration Load

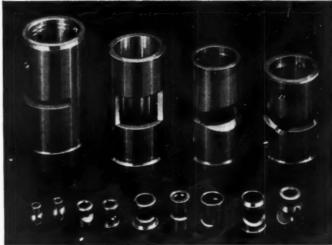
Electric eyes are now acting as a wattload regulator for meter calibration at the Westinghouse meter division, Newark, N. J. Fastened to the end of the meter needle is a small mirror from which a beam of light is reflected to a pair of photoelectric cells. As long as the load is constant, the needle is constant, the light falls between the electric



CALIBRATING METERS require two pairs of eyes. The man supplies one pair, photo-electric tubes the other. Electric eyes "watch" the movement of the instrument needle and hold load constant during calibration period.

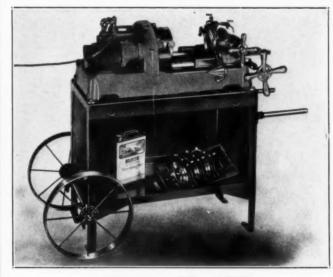
eyes. Should the load change the light would swing to either of the tubes acting as electronic amplifiers making corrections in load. By this means the meter not only indicates the load, but regulates it as well.

The scheme is useful now that thermal-type meters are coming in vogue. These require a comparison with a standard over a period of several hours. This idea can be applied equally well to jobs where volts, amperes, power factor, frequency or mechanical quantities must be held constant.





● All oil grooves, holes, slots, etc., are correctly machined in Bunting Bronze Electric Motor Bearings. They are ready for installation without further finishing. Available from stock for motors of practically every size and make. Ask your wholesaler. Write for catalog. The Bunting Brass & Bronze Company, Toledo, Ohio...Warehouses in All Principal Cities.



highly
efficient
low
priced
portable
powerful
speedy
rugged

BRONZE BUSHINGS

BEARINGS

PRECISION

BRONZE BARS

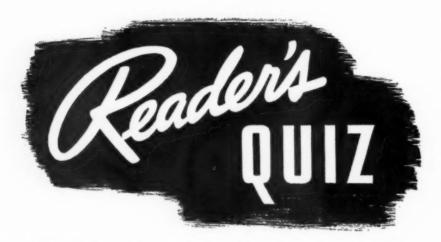
BABBITT METALS

Beaver Model-B 1/8 to 2-inch Pipe and Bolt Machine

For % to 2-inch pipe—¼ to 1½-inch bolts. Up to 8-inch with drive shaft and geared tools. Rack-and-pinion feed. Cast steel-iron base and cap. All-steel geared universal pipe chuck—with safety automatic wrench ejector; hinged full-range reamer; sliding wheel or knife cutoff; ring-type opening adjustable dishead—no hinge. Automatic gear-driven oil pump. All gears enclosed and run in oil. Choice of 110 or 220 volt universal reversible motor. Weighs about 280 lbs. In use in finest pipe shops throughout the country.

Write for Bulletin B.





QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published, we pay \$5.00.

STARTING TROUBLE

UESTION 46. A 5 hp., single phase, repulsion induction motor had proper voltage at the terminals, current would flow in the line, rotor clearance was satisfactory, commutator and brushes were in good shape yet the machine refused to start. It was thoroughly overhauled, but the trouble persisted. Suddenly on pressing the start button it moved and has worked satisfactorily since. Have you any similar experience on this type of motor and what is the cause of the trouble?—F.L.C.

TO QUESTION 46. The trouble you encountered on a five hp. single phase repulsion induction motor may have been caused by the centrifugal short circuiting switch sticking in the running or short circuited position. This trouble is very easily overlooked especially on motors that have the short circuiting switch on the end of the commutator rather than on the inside.

Another cause may have been the accidental shifting of the brushes to the neutral position which requires a movement of only about \(\frac{1}{4} \)-in. on most single phase motors. The motor in this position has no tendency to rotate. There are many other troubles that could cause this action but I think the above two cases are most often overlooked.—M.H.

TO QUESTION 46. Assuming that the brushes were set in the correct position, it is quite possible that the short circuiting collar did not release properly when last used. With the commutator short circuited your motor would then become a straight

induction motor and could not start on single phase current. After the collar released itself, either through vibration or some other unknown reason, your motor could be operated again in its regular manner.—J.L.J.

FINDING DEFECTIVE HEATING ELEMENT

UESTION 47. On a tool hardening electric furnace having 10
heater elements connected in series single phase, 230-volt, it is
difficult to locate a burnt out element, test lamp or coil being of no
use due to resistance. The element
connections are brought outside of
the furnace but what is the quickest way to find the burnt out element in hot and cramped quarters?
—S.C.

TO QUESTION 47. A volttest lamp. The fact that you find a test lamp to be of no use due to the resistance indicates you are using a test lamp of too high wattage. I would suggest that you obtain a neon tester rated for 90 to 550 volts a.c. or d.c. This handy device draws negligible current and should indicate the burnt out element as readily as a voltmeter.—G.I.S.

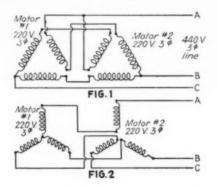
TO QUESTION 47. To find a burnt out element we use a piece of strap iron about ½-in. by 1-in. and about 30-inches long or any similar handy piece of iron. By shorting the ends of each element momentarily, the element that is open will spark consid-

erably, the good elements will not spark. If 2 elements are burnt out you will have to short 2 or more to find the open elements. The handle end of the iron rod may be insulated or handled with gloves.—W.L.C.

MOTORS IN SERIES

UESTION 48. Would it be practical to connect two 220 volt, 3 phase, 60 cycle squirrel-cage induction motors in series to a 440 volt, 3 phase, 60 cycle circuit? If so, explain or show by diagram such a connection.—W.B.

TO QUESTION 48. It does not seem practical to connect two 220 volt, 3 phase squirrel-cage induction motors in series to a 440 volt, 3 phase circuit. The only way such motors could be connected in series



would be by "breaking into the windings" so that corresponding phase coils could be connected in series across the 440 volt lines. If only 3 terminals are brought out this would be very difficult.

In case the connection can be made the motors must be put on the same shaft or coupled together mechanically to operate satisfactorily.

For delta connected motors the connection would be as shown in Fig. 1 and for a "Y" connection as shown in Fig. 2.

Some motors are arranged for either 220 or 440 volt service and with such motors the connections can be changed rather simply. With straight 220 volt motors it would seem advisable to try to trade them for standard 440 volt motors.—J.E.W.

TO QUESTION 48. Polyphase voltages applied to a properly connected stator winding will produce a rotating field. This field is primarily dependent upon the voltages which vary harmonically and with a time phase displacement; the mechanical angular displacement, which involves the physical position of the pole phase

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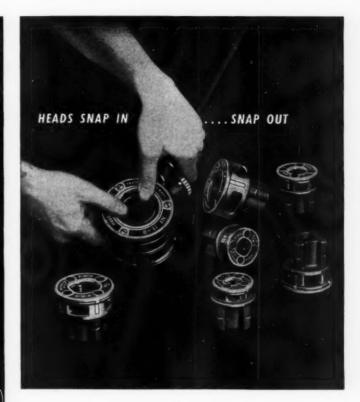


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[FROM PAGE 70]

groups, and the electrical angular displacement involving physical position and electrical connection. By virtue of this, polyphase voltages applied to two or more stators properly connected in series should produce individual rotating fields. Furthermore, if the stator windings and characteristics of the motors are the same, the voltage reactions should be similar to reactions on two or more equal impedances in series. Consequently, the voltages across the primaries will be equally divided under these conditions. There seems to be nothing significant to disprove that on this basis, and within certain limitations it is practical to operate two induction motors in series.

To accomplish this operation there are a few requirements which must be fulfilled in order to obtain proper results. These are outlined here. The two rotors must be coupled together. This prevents unequal slip which would otherwise cause unbalanced stator reactions and unstable operation. Both motors should have practically identical operating characteristics. The horse-power, speed, voltage, frequency, current, and mechanical features must be equal. In addition, the primary windings should be identical with respect to method of connection and other data.

Finally, for series operation, it is further necessary to disconnect the wye or delta sections of the two motors and to reform again with the two windings in series. Proper attention should be given to the method of interconnection to eliminate the possibility of incorrect phase sequence.—O.A.

GENERATOR FOR P. F. CORRECTION

UESTION 49. We would like to use a 3-phase, 60 cycle generator as a synchronous motor for power factor correction. After the motor has been brought up to synchronous speed by a smaller motor, should the field switch be closed first or should the 3-phase current be applied to the stator first?—J.J.L.

A TO QUESTION 49. The three phase current should be applied first. If the field is excited first the characteristics are those of a generator and would have to be synchro-

nized to the three phase circuit before being put on the line. On the other hand, if the three phase current is applied first the characteristics are those of a motor and the generator is in phase with the line current and voltage because the same voltage is impressed on both. The field is then excited and the generator will pull into synchronous speed.

If the field is excited first and synchronized to the line, in all probability when it is connected to the line, it will stall the starting motor, since it would only be large enough to rotate the generator, and since the generator has the characteristics of a generator, as soon as it is connected to the line, it will try to supply part of the current to the already connected load.—C.E.S.

TO QUESTION 49. In using the 3-phase, 60-cycle generator as a synchronous motor for power factor connection, it would be best to bring this machine up a little above synchronous speed. Then close the main breaker to connect the machine to the 3-phase line. It will then be acting as an induction generator. Disconnect the driving motor from the source and when the alternating current drops to a very low value as the machine drop to synchronous speed close the field switch. This should be done when the speed is as near the synchronous speed as possible. —J.E.W.

TO QUESTION 49. Unless you o do not have enough feeder capacity to start the synchronous motor use the small motor for starting Auto transformer or across the line starting using damper windings as an induction motor is simpler. The field is best controlled by a relay set to operate when the exciter is delivering proper voltage or with a fixed time delay. The relay is to open the field discharge circuit. The other method of closing the field first and then the a.c. can be used but there is a much greater chance of trouble due to induced voltages in the field and exciter circuit. Try the manufacturer for further information .-H.V.S.

CHANGING STATOR POSITION IN FRAME

UESTION 50. What is the effect on the performance of a 3 phase, 60 cycle, 440 volt induction motor if the stator is turned end for end or rotated \(\epsilon \) deg?—H.D.M.

A TO QUESTION 50. Theoretically, turning the stator 90 deg., 180 deg., or end for end, would



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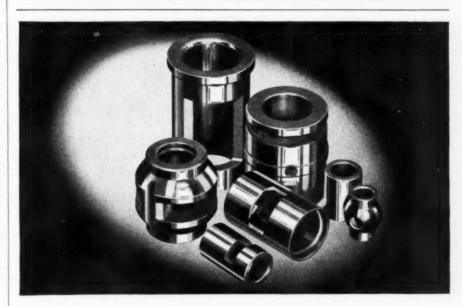


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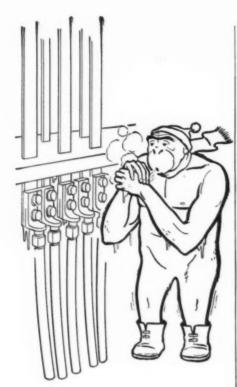
The cost of installing bearings in a motor is greater than the price of the bearings. That is one reason why it's advisable to use only the best available. Specify JOHNSON BRONZE and you will get the highest quality bearings—from stock. Write for our new catalogue.



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Electrical Contracting, May 1942



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Write for literature fully describing the line.

National Electric



[FROM PAGE 73]

have no effect on the performance of the motor. However, on some of the older types of motors the machining of end bells and the frames may be imperfect, and the stator, if turned end for end, would not line up with the rotor. Rotating the stator does not effect the performance of the motor.—C.S.

TO QUESTION 50. There is induction motor when the stator is changed end for end, as standard practice is to assemble the motor so when you face the pulley end of shaft the motor leads are on your left hand side, but the motor will operate with all the same characteristics when assembled in the opposite manner. Also any motor can be turned 90 or 180 degrees so that it may be operated on the wall or ceiling if the end bells are turned so that the oil wells are in the proper position to hold oil.—J.G.S.

AVERAGE MACHINE LOAD FACTOR

UESTION 51. Can you give a method or a formula for quickly estimating the ratio of overage load to connected load for a 10-hp. motor, run 8 hr. per day for 25 days, assuming average horse-power to load application and normal load variations of machine tool operation.—S.R.M.

TO QUESTION 51. Estimates • may be based primarily upon several of the many related factors involving diversity of machine tool load, character of drives and consequent approximate operating point efficiency of the motor. Load cycles of the machine tool and the corresponding effects on gear ratio, direct coupling, flywheel reaction, etc. have a significant bearing on the maximum demand and average power. The numerous variables make a formula set-up difficult as well as unreliable. Periodic load readings on similar apparatus may make substantial supplementary items in determining the average power.

In view of the small amount of power involved, it would not be incorrect to base the estimate purely on observations made on the average machine tool. The following outline is based on this fact. A total of 30 minutes is taken as a mini-

mum no-load period within an 8 hour run. This may cover only checks made in the process of machining. The actual load on the motor for average operations may be assumed, without much error, to be about .90 of the rated output. Consequently the power input at .85 efficiency is 7.9 kw. The total energy for 25 eight-hour days is 1480 kw.-hours. (During an 8 hour day the motor is assumed to be either idle or at no-load operation for 30 minutes). On this basis, the load-factor, which is the ratio expressed in per cent, of the actual energy used over the total energy which could have been used during a standard 720 hours for a period of 30 days, is 26 per cent. The demand factor is about 90 per cent. It represents the ratio of the average load (input 7.9 kw.) over the maximum connected load (input 8.8 kw.) No definite time limit is used in determining the demand factor .- O.A.

Can You ANSWER these QUESTIONS?

QUESTION C2.—Can the speed of a compound-wound motor be adjusted by the use of a variable resistance connected in series with the shunt field winding, as in a shunt motor?—R.C.M.

QUESTION D2.—Recently while inspecting a large totally enclosed synchronous motor an electrical discharge was observed in the air gap between the stator and rotor. This arc or discharge occurred only during the starting period. The end bells were off at the time. The usual tests for grounds, opens, etc. did not show any trouble. Is this a common occurrence on this type of equipment and is the discharge likely to harm the machine?—G.A.H.

QUESTION E2.—Does someone have a formula for figuring the size and number of grids or resistors for three phase slip ring motors? I would like to hook these up for both starting and continuous duty. Our motors run from 5 to 300 hp. I can hook 'em up but I am not sure of the number or size required.—R.P.

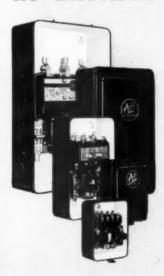
QUESTION F2.—We have a 150 kva., 480-volt, 60 cycle, 3 phase generator with direct coupled exciter which we would like to change to a synchronous motor for power factor correction. What changes will have to be made on the generator before we can use it as a motor and what starting equipment will be required?—J.J.L.

PLEASE SEND IN YOUR ANSWERS BY JUNE 1



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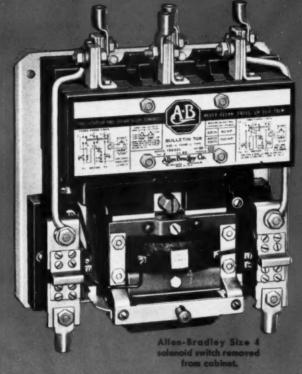


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Size 0-2 hp, 220-440-550-600 v

Size 1−5 hp, 220 v 7½ hp, 440-550-600 v Size 2−15 hp, 220 v

25 hp, 440-550-600 v Size 3-30 hp, 220 v 50 hp, 440-550-600 v Size 4-50 hp, 220 v 100 hp, 440-550-600 v



The Bulletin 709 solenoid starter is a favor-lite with plant electricians because it comes in 5 sizes . . . in 3 forms . . . in 9 different endosures . . . and it is backed by 1001 kinds of push buttons, limit switches, and relays in the standard Allen-Bradley line.

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TO MOTOR

PILOT CONTROL TRANSFORMER

SIDE CONTRACTOR

LOW VOLTAGE PILOT CONTROL CIRCUIT



Note the small pilot control transformer mounted in the switch cabinet. The low voltage control circuit is shown in yellow in the above diagram. The high voltage circuits are shown in red. The control circuit is electrically separate from the main power circuit. Combination starters... with their built-in safety switches ... are always "safe" starters. But there is EXTRA safety when you install Bulletin 712 combination starters with low-voltage pilot control circuits, especially where 440, 550, or 600 volt power is used.

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Remember, too, the wiring and space economy of combination starters. Machines can be easily moved with little disturbance to existing wiring. Why not send for Bulletin 712?

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plied to over 310 motors and the lighting transformers from this substation. Lighting is taken off the 440 on each floor by a bank of three 10-kva. aircooled type of transformers.

As Robertson cellular floor was used in the construction of all the flooring at a decided structural and economical advantage, all of the power wiring was installed in it. This gave flexibility and enabled conduit stubs to be brought up through the floor directly under the motors. It also permitted later installation of all additional control wiring without running exposed conduits on the ceiling or floor. Any future changes can likewise be made neatly and conveniently in the same manner because of the existence of channels in the floor for circuit runs and access units spread at 2-ft. 6-in. intervals.

Each floor has three power panels of the circuit breaker type, from which two cellular headers run to feed the access units, which in turn feed to the cells. Provision was left in all panels for future increases. In addition to the cellular floor 49,000 ft. of conduit of various sizes were used. Wire of all sizes totalled 242,000 ft.

On the fifth floor where the bottling machinery is located, there are two panels for each of the five lines of bottling machines. Moisture and water are common around this equipment. Therefore the panels are mounted on platforms 7 ft. above the floor, which also gives unobstructed passage between the conveyors and bottling lines.

In these elevated panels are located all circuit breakers, starters and control equipment for the bottling machinery. Waterproof start and stop buttons and pilot lights are located at all operating locations. Care was taken to give audible warning when a motor-driven piece of equipment is stopped for any reason. The conveyor system likewise is interlocked with the bottling equipment and equipped with limiting devices to permit automatic free flow of the cases, with a minimum of attendance and pile-up.

Electric heating was also supplied to offices remote from the steam lines.

Intricate Conveyor System

It was on the conveyor system that the engineering of intricate interlocking controls was required. The 5,700 ft. of conveyor system was desired by the

management to be capable of distributing cases of different sizes and weights, at varying speeds, to be unloaded at the variety of storage spaces as desired, sometimes letting enough boxes through to feed waiting trucks or empties to supply the soaking and washing machines. To do this the conveyor system was laid out on the storage floors like the switchyards of a railroad.

Stop buttons are located at all critical points, so interlocked as to stop the flow, if necessary, all the way back to the bottling machines. Since this contingency is not a desirable one except under extreme emergency, selector switches are provided to select conveyors upon which to direct cases to different parts of the building with the minimum of man power in attendance.

Empties are unloaded at the trucks on the main floor, taken up to the third floor on conveyors which merge from the several loading platforms to two conveyors that feed a sorting table. From the sorting table the bottles are either sent to storage on the third or fourth floors or part of them allowed to go directly to the soaking tanks and washers on the fifth floor. These washers are fed from the fourth floor. The empty cases on leaving the soaker pass the inspection department. Damaged cases are passed to a conveyor which takes them to a bin for future bailing. Usable cases continue to the fifth floor to be sent to the packer who in turn refills them with the filled bottles and places them on the down conveyor either to go to the storage floors or directly down to the waiting trucks. Control stations are provided at the truck platforms to start and stop the cases down the decline from the second floor. Only at one point is it necessary to keep personnel to eliminate pile-ups and to watch the line from the bottling floor to storage.

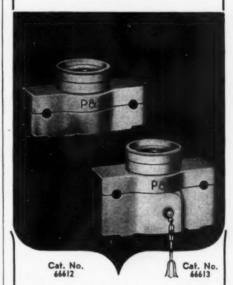
On the second floor receiving end for full cases, it is necessary to select any one or more of the 10 conveyors running parallel across the storage floor. These cross conveyors are interlocked by a twist lock plug into a receptacle at a switching point. This control box has in it three switches, a forward, reverse and a stop button.

Lighting is provided by over 500 twolamp 40-watt fluorescent industrial fixtures. There are 620 light outlets and 102 convenience outlets installed. Fluorescent lights were selected because of quality of light and economy in current consumption.

Each floor has two circuit breaker panels for lighting. Circuits are so arranged that any conveyor section can be lighted separately without lighting

[Continued on Page 78]

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GENERAL	ELECTRIC

Streamlined Brewery Wiring

[FROM PAGE 77]

unused areas. Each floor has a bank of three 10-kva. transformers fed from the 440-volt power system, connected to provide 4-wire 120/208-volt branch lighting circuits. A minimum of No. 12 wire was used to prevent excessive voltage drop and all circuits have a future capacity of approximately 300 per cent.

Because ceilings were dropped 3 ft. below the floor slab on the storage floors, the lighting could not be stubbed directly from the cellular floor ducts. A separate conduit feeder system for the lighting was therefore run above the dropped ceiling.

Communication

To facilitate fast and direct communication, two systems of RCA loud speakers were installed. One system allows the shipping and bottling office to page and to carry on a conversation with anyone in the building, except on the fifth floor.

The second system consists of a master loud speaker station for selective calling and talking between the bottling office, soaker feed, fillers, labellers, cellars and machine shop. There is an annunciator system to the machine shop from points along the bottling line to call for emergency repair service. Dictographs, telephones, telecall and ADT were extended to the three offices from the existing network now in service in the main plant and office building. A program clock was installed with bells and horns for the regulation of shift changes. Bottle counters, six of them, were centrally located in the bottling office on the fifth floor mezzanine.

The complete electrical job also included the location of polarized power plugs at convenient locations on the 5th floor for use of welders in maintenance and repairs.

The government measuring cellar, equipped with refrigeration and glass lined tanks, was lighted by means of a row of two-lamp Westinghouse fluorescent glass enclosed fixtures. Each tank interior is illuminated through a glass port equipped with a flange above which is mounted a reflector and lamp. This was done to facilitate cleaning.

Alterations were made to the main switchboard of the plant at the same time this job was done and the plant electrical capacity doubled. The entire job was engineered and installed by Buzzell Electric Works, San Francisco, under the supervision of E. L. Chaix, electrical construction superintendent.



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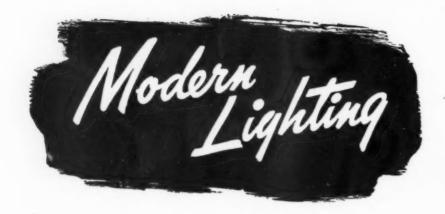
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FOOT-CANDLES for recreation make this well lighted play room a pleasant place in which to relax, read or take part in the host of games provided.

recreation room of the new office building of the Standard Oil Company of New Jersey at Elizabeth, N. J.

Continuous rows of Wheeler recessed units were mounted on 8-ft. centers in the 8-ft., 6-in, suspended ceiling of the room. Each 8-ft. section of the trough contains a single row of 40-watt fluorescent lamps mounted end-to-end and fed by a two-lamp ballast. No cross louvers were necessary.

MAKE-UP ROOM LIGHTING

A striking job of relighting a newspaper make-up room was done at the *Times-Picayune* in New Orleans. The original lighting consisted of a system of filament lamps for general illumination, supplemented by local lighting.

This produced an average of 20 to 40 foot-cardles of illumination which, although above average for newspaper plants in that area, was characterized by "pools of light."

The relighting was accomplished by using 48 new G.E. mazda 100-watt fluorescent lamps in 24 two-lamps, open type, direct, Miller fixtures. The average maintained foot-candles is now 70. This wealth of cool light has materially speeded up make-up operations, reduced errors and has greatly improved utilization of floor space.

FLUORESCENT TROFFER LIGHTING

Troffer lighting is being more and more used as a method of providing high quality lighting in office areas. It is really the outgrowth of the application



LIGHT UTILIZATION is high in flush troffer systems. Working with figures is easy in this financial office where foot-candles are high.

of fluorescent lamps to coffer lighting, and of fluorescent lighting to areas with acoustically treated ceilings. Here is an installation at The Meriden Permanent Building and Loan Association, Meriden, Conn. There are between 35 and 40 foot-candles provided in the area from Miller troffers equipped with the white fluorescent lamps and spaced four feet apart in a 13-ft., 9-in. ceiling. The installation comprises twelve 14-foot rows and three 12-ft, rows running through the center. On either side are 19 four-foot rows. With systems of this type the utilization of light is high, and dependence doesn't have to be placed on the ceiling to reflect the light.



NO TYPE ERRORS in this New Orleans newspaper make-up room since it has been relighted to a 70-foot candle intensity with cool fluorescent lamps in open reflectors.



CALL YOUR DAY-BRITE REPRESENTATIVE

You'll be agreeably surprised to learn how effectively your Day-Brite Engineering Representative will help you. Call him—whatever your lighting requirements may be, Day-Brite can meet them adequately, quickly. Not with generalized suggestions—but with specific recommendations based on a detailed analysis of your individual requirements. Where necessary, a complete layout and blue-print service is available. This service is gratis, in the interest of Light for Victory.

TURN YOUR THOUGHTS TO LIGHT, and you will find the answer to many of your planning and production problems — particularly if you specify the lighting fixtures designed to give you all that fluorescent has to offer.

The design of Day-Brite Fluorescent Fixtures takes into account all of the most advanced principles that effectively control the output of this newest source of light... Correct spacing of tubes — proper shielding — maintenance of cut-off angles that govern light distribution — high-power-factor ballasts, lamp starters and other approved accessories — all are combined in Day-Brite Fluorescent Lighting Fixtures to assure an effective flood of glare-free illumination over the entire work area . . . Look to Your Ceilings . . . Add Victory Hours with Day-Brite, the Rival of Day Light!

DAY-BRITE LIGHTING, INC., 5438 BULWER AVE. . ST. LOUIS, MO.





WHEELER "DAY-FLO" FLUORESCENT UNITS GIVE THIS PLANT 50 FOOTCANDLES OF "PRODUCTION BOOSTING" DAYLIGHT ILLUMINATION

One of the surest, quickest and most economical ways to keep production levels uniform is by providing more and better light.

Good lighting is a major production tool. It enables workers to see clearly and easily at all hours — day and night. It helps eliminate accidents, eye-strain, fatigue, rejects and other factors that result in production slow-downs.

The unretouched night photograph shown above, was taken in the Assembly and Final Inspection Department of a large manufacturer. Wheeler "Day-Flo" Fluorescent Units provide an average illumination of 50 footcandles on the working plane — abundant illumination for workers to see easily at all times.

There are types and styles of Wheeler Fluorescent Units to meet practically any industrial lighting requirement. Wheeler engineers are available to assist you in recommending and planning a good lighting system.

WRITE FOR COPY OF NEW BULLETIN "WHEELER FLUORESCENT LIGHTING EQUIPMENT"

Distributed Exclusively Through Electrical Wholesalers, Manufacturers of Lighting Equipment Since 1881. WHEELER
REFLECTOR COMPANY
275 CONGRESS ST., BOSTON, MASS.

NEW YORK CLEVELAND REPRESENTATIVES IN PRINCIPAL CITIES



[FROM PAGE 82]

LIGHTING IN A LARGE WAR INDUSTRY

One of the things which adequate lighting can do to help win the war is to make minutes more productive. By cutting down on the time required to see



CONTINUOUS ROWS of fluorescent units provide 50 foot-candles in this industrial plant.

details, production can be increased when production is so vitally needed.

Here is an air-conditioned assembly room in a large New England industrial plant. The room is 100 feet long, 30 feet wide and 14 feet high with glass brick construction on three sides to take every advantage of daylight. The lighting is provided by ten rows of Miller RLM's equipped with 40-watt white mazda F lamps and spaced 10 feet apart. The result is 50 foot-candles of cool, well diffused lighting.

LARGE GENERAL OFFICE

The A. C. Nielsen Company, Chicago have a system of aluminum troffers with modified parabolic contour. These units are placed on 3 foot centers and there are approximately 40 footcandles in service.

One of the best tributes that can be paid to a lighting system is to be unconscious of where the light is coming from. That's the case here and the reason for it is because of the low-brightness of the reflector mouth. In many troffer installations, this brightness has been objectionable to the point of causing annoyance. A glance at this illustration and it is seen that the farther down the room one looks, the more in-

How to Secure *Easily and Economically* An Effective AIR RAID ALARM SYSTEM For Your Plant

In planning an effective air raid alarm system for your plant you are confronted with numerous problems. First and foremost among these is the problem of providing an immediately recognizable signal which will be heard clearly by every employee working in any part of the plant, inside as well as outside. Then there is the equally important problem of saving critical materials by utilizing all present audible systems in such a manner as not to cause confusion with existing fire alarm or paging systems.

Problems of Coordination

Other problems are those of coordinating with the present municipal alarm system, of preventing confusion in surrounding residential areas and of keeping the wheels turning as long as possible in order not to interrupt essential production.

Walls, partitions and closed windows act as obstructions to sound. Noise from typewriters, machines and other manufacturing processes make it difficult, if not impossible, to hear outdoor signals.

Also, as the travel of sound is affected by distance, direction and velocity of the wind, and other atmospheric conditions, the probabilities of having general outdoor signals heard inside of a building are still further reduced.

Supplementary Plant Alarm System Required

For these reasons, usually dependence must be placed upon the plant alarm system. Where the present plant whistle or other plant alarm systems do not lend themselves readily to air raid alarm without confusion, or where the present system does not penetrate sufficiently to give a clear signal that is immediately recognized by everybody working in the plant, then Benjamin Sirens or Benjamin Howlers with their distinctive tone and noise penetrating qualities will provide an economical solution.

Utilizing Existing Wiring Systems

Materials are conserved and many economies may be effected by controlling the Benjamin Sirens or Benjamin Howlers by means of the Benjamin Telecode Relay. Frequently the existing plant telephone wiring system may be used to actuate the relay which in turn will close a circuit to actuate the siren connected directly to the

BENJAMIN TELECODE RELA BENZAMIN HOW BENJAMIN SIRENS and TELECODE RELAYS CONSERVE VITAL MATERIALS

110 or 220 volt power or lighting system in the plant.

Another method employs open bell wiring connected to a key at the desk of the plant defense coordinator or other official charged with plant protection.

Free Data Bulletins

Upon request on your letterhead, you will receive without cost or obligation a bulletin giving illustration and description of the Benjamin sirens, howlers, Telecode Relay and other signaling apparatus and wiring diagrams showing how the Telecode Relay may be used with the present wiring to the fullest extent. Address Benjamin Electric Mfg. Co., Dept. H, Des Plaines, Illinois.

BENJAMIN GALLALA AMATEMA



BENJAMIN CALL SYSTEMS CUT DELAYS.. SAVE WASTE

More than ever American Industry needs the efficiencies and economies effected through the use of Benjamin Call Systems. In hundreds of America's plants, large and small, these systems are cutting time waste and preventing production losses by providing the way to reach key men quickly, to give immediate effect to orders throughout the plant, to obtain instant response from office and factory personnel. They are also used as illegal entry warnings and as fire alarms.



WE HAVE BEEN DOING THIS TOO LONG

We have been hiding a light (figurative, of course) under a bushel. We mean the untiring, behind-the-scenes work of our research and design staffs who are working today on the problems of tomorrow's lighting. When new light sources are developed, Silv-A-King equipment will be ready to put them to the most effective use. For 21 years this policy of looking ahead has been a major factor in establishing Silv-A-King's reputation as lighting specialists throughout industry. Bright Light Reflector Co., Inc., 1031 Metropolitan Ave., Brooklyn, N.Y.



Write for one or both of these Silv-A-King Lighting
Guides: LG1 — Fluorescent, or LG2 — Incandescent,

AFewTypicalSilv-A-King Users:

AC SPARK PLUG
GENERAL MOTORS
FISHER BODY
INTERNATIONAL HARVESTER
JONES & LAUGHLIN STEEL
PITTSBURGH PLATE GLASS
and many others



SILV-A-KING MAKES Light WORK FOR YOU

Modern

[FROM PAGE 84]

conspicuous the units become; at the far end of the room they seem to blend right into the ceiling.

While diffuse aluminum sheet troffers are no longer commercially available, a similar effect was had by employing aluminum paint on steel. Now even the aluminum paint cannot be obtained and



DIFFUSING SURFACE of flush units spreads light evenly on desks.

at the present moment we are back to a glossy white synthetic finish. The brightness is, of course, higher than aluminum but this finish will doubtless be employed until some substitute material is found that is not on the priority lists and which will have the same reflection characteristics as the sheet aluminum,

DRAFTING ROOM LIGHTING

The work of the drafting room is a well-balanced use of intelligence, manual skill and vision. Only one who has made drafting his vocation can realize the constant strain imposed upon his



FLUORESCENT TROFFERS, using 40-watt daylight lamps, give 75 footcandles on drawing boards.

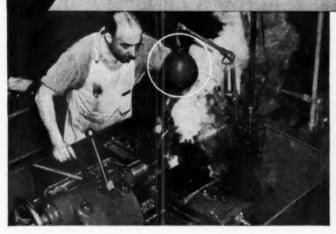
Electrical Contracting, May 1942

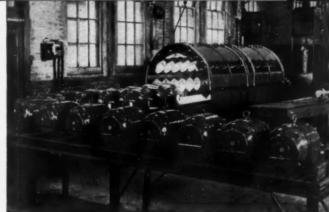
TAL WEAPONS FOR VICTORY ON THE PRODUCTION FRONT

BALANCED LIGHTING for BETTER SEEING ON THE JOB



INFRA-RED PROCESS for BETTER BAKING AND DRYING





More Speed ON THIS TOOLING OPERATION

Engineered production and engineered lighting go hand in hand. In the automatic lathe operation pictured above, tough steel impeller shafts are turned down in 3 minutes as compared to 9.7 minutes by less modern equipment. The Fostoria flexible arm Localite provides engineered lighting on the job of needed intensity for fast, accurate seeing of every work detail.

Balanced lighting, the proper combination of "closeup" lighting with background or overhead illumination, is now speeding war production in hundreds of industrial plants. Do you have this vital weapon for victory on your plant production front?

More Speed ON THIS PAINT BAKING JOB

Production increased from 1600 to over 6000 electric motors per month - a bottleneck of paint baking cracked by utilizing the amazing drying speed of the modern Near Infra-Red Process. As pictured above in a plant where 90% of output is for Defense. the complete motor frame and shield is paint sprayed and then baked dry in only 5 minutes in the Fostoria Para-Sphere tunnel.

Industry, everywhere, is turning to Infra-Red as a vital tool for speed-up of baking, drying, dehydrating and preheating operations. Request details of the many advantages and case studies applicable to your production problem.

THE *FOSTORIA PRESSED STEEL CORPORATION, FOSTORIA, OHIO Festoria Products Manufactured and Distributed in Canada by Amalgamated Electric Corp., Ltd., Toronto, Canada

YOUR NEAREST FOSTORIA INDUSTRIAL SERVICE STATION

For Counsel on Lighting and Drying Problems

Sprague Electrical Supplies, Inc. Bridgeport, Conn. 777 Main St. Phone: 4-2141

Wipperman & Mitchell, Inc. Buffalo Month Oak St. Phone: Ladayette 2135

Charleston, W. Va. Phone: Ladayette 2135

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Lee J. Meyberg Company
Francisco. 70 Tenth St.
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David Y. Robinson

* FOSTORIA LIGHTING AND INFRA-RED EQUIPMENT IS NOW AVAILABLE ONLY ON PRIORITY RATED ORDERS.





NO. 1184-M RLM THREADED DOME REFLECTOR

★ QUAD Units all have correct basic design and construction features. The RLM Label on QUAD Lighting Units assures your customers of modern, correct, and high quality commercial and industrial lighting. It's the line that will be popular tomorrow as well as today.



QUADRANGLE MFG. COMPANY



[FROM PAGE 86]

eyesight as he works on a fine detailed drawing throughout the day. The accepted level of illumination for drafting rooms has been steadily increasing and today with our all-out efforts requiring speed along with accuracy, management is frequently found providing more than the 50 foot-candles regarded as standard.

The most important single feature of good drafting room lighting is the absence of shadows such as are caused by the edge of a T-square or a triangle. Although the quality of lighting provided by a troffer installation is of high calibre there is still liable to be some shadows, especially where the draftsmen work on flat boards. This can be entirely eliminated, however, by placing troffers at a 45° angle to the board. The illustration shows such an installation employing 40-watt daylight mazda F lamps and providing 75 foot-candles. The troffers are on 2-foot centers.

Lighting a MACHINE SHOP

Fluorescent

PROBLEM—To provide a high level of illumination to insure seeing comfort and maximum productivity in the most efficient manner.

CONSTRUCTION DATA—The entire building was illuminated with similar lighting units. The units were mounted on trolley ducts, so that supplementary units could be installed whenever needed.

SOLUTION OF PROBLEM—The illumination was provided by the use of Frink Linolite Fluorescent units, equipped with two-40 watt white Fluorescent lamps. The units were spaced on 6-ft. 9-in. centers and mounted 9-ft. above the floor. They were designed so that the maximum light is distributed directly below the luminaries without harsh shadows. Each lamp in the fixture has a separate reflector, thus, permitting good control of light as well as high efficiency.



PART PLAN of lighting layout showing spacing of fluorescent lighting units.

RESULTS—An illumination of 60 foot-candles was provided on the working surfaces. The high efficiency of the fixture is easily maintained because the porcelain enamel reflectors are easily removed for cleaning without dismantling the luminaire.



HIGH LEVEL fluorescent lighting produces excellent detail discrimination on metal objects in this machine shop.

Frecision Is Vital Today. Accelerated indus-

Today. Accelerated industrial production—mechanical accuracy—long hours—demand factory and mill lighting that only skillfully engineered fluorescent units may be counted upon to provide.

Quality Lighting ...

An Old American
Custom. Curtis quality—dependable for 44 years—is built into Curtis Industrial Fluorescent Units for every need—efficient, rugged and practical—designed to deliver maximum results. Are you capitalizing on the opportunity for sales and service of Curtis fluorescent units to industry?



CURTIS LIGHTING, INC.

6135 WEST 65TH STREET CHICAGO New York Office: 230 Park Avenue

HERE'S WHAT THIS G-E TRADE MARK MEANS TO YOU!

- 1. ALL THE BENEFITS OF MAZDA* RESEARCH . . . The very latest improvements coming from MAZDA Research laboratories are immediately available in the G-E MAZDA Fluorescent lamps you sell.
- 2. ALL THE ADVANTAGES of General Electric's 60 years of lamp making experience, including all the manufacturing skill, engineering resources and knowledge of General Electric... go into the G-E MAZDA F lamps you offer customers.
- 3. MORE LIGHT AT LESS COST... Since MAZDA Research introduced the first practical fluorescent in 1938, G-E MAZDA F lamps have been steadily improved in efficiency, and reduced in price. On some lamps the price has been reduced as much as 60% since 1938.
- 4. YOU CAN OFFER CUSTOMERS a complete line of G-E MAZDA F lamps, from the tiny 6-watt to the giant 100-watt size, uniform in quality and color.
- 5. YOU HAVE THE ADVANTAGE of a public preference for products that carry the famous mark of G-E quality. G-E's research leadership has long been a factor in the production of quality products.

Of course, fluorescent lamps are just one of many types of lamps General Electric makes to supply every lighting need. If you run up against a knotty lighting problem in serving your customers, perhaps General Electric's lighting engineering service can help you solve it. For your information, see your nearest G-E lamp division office or write General Electric Company, Dept. 166-EC-5, Nela Park, Cleveland, Ohio.

*MAZDA is not the name of a thing, but the mark of a research service.

G-E MAZDA LAMPS

HERE'S WHAT IT MEANS TO CUSTOMERS IN WAR PRODUCTION!

GENERAL ELECTRIC Fluorescent lighting is being used in many war production plants—like the plants shown below—where speed, precision and reduced spoilage are so vital. Yet thousands of other war industry plants—

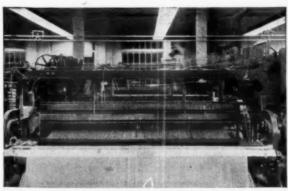
especially the smaller ones—urgently need this cool "indoor daylight" to speed their production right now. You can sell them new G-E Fluorescent lighting to get the light they need . . . provided they get a suitable WPB priority rating.



Inspection department of a war industry plant. Since new fluorescent lighting was installed, inspection of small parts has been speeded up and errors reduced, while both production and efficiency have been increased.



2 In this assembly plant of a woodworking machinery manufacturer, G-E Fluorescent lighting made it easier to read micrometers and resulted in using 15% less time to make settings and adjustments of machinery.



Weave shed of textile company. G-E Fluorescent lighting helped effect an increase in efficiency in one style of weaving from 80.5% to 84.0%. Another style showed increase in weaving efficiency from 83.0% to 87.0% with 18% decrease in sewing costs.

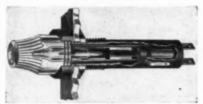


4 This new war plant, now producing a vital war weapon, is lighted with 18,000 40-watt G-E MAZDA F lamps. Production is speeded up. Workers are happier and less tired because they conserve energy through easier seeing.



Indicator

This indicator light goes on only when the circuit is broken. Listed as panel mounting, No. 1414, it is made for panels up to $\frac{4}{16}$ -in. thick and $\frac{1}{2}$ -in. mounting hole; black bakelite body and transparent molded cap. It is designed to use Littelfuse No. 5122 lamp. It can be had for 24 or 48 volt filament bulb, with which no resistor is used. Otherwise it uses a built-in 200,000 ohm protective resistor, in series with a neon lamp. Overall length is 2-in. below panel, $\frac{2}{6}$ -in. above panel. The rating is 90 to 250 volts. Littelfuse Incorporated, 4757 Ravenswood Ave., Chicago, Ill.



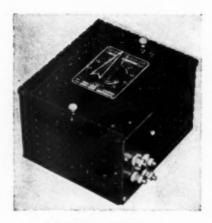
LITTELFUSE PANEL MOUNTING

Motor

This fan cooled motor, known as Cowl-Cooled, is for use in dusty locations and for all applications where the conventional type of totally enclosed motor has been recommended. The ventilating air is blown over external ribs, which run the length of the frame, and is not forced through internal passages. Motors are now available in standard NEMA frame sizes up to 20 hp. either ball or sleeve bearing equipped. Ratings are 220, 440, 550 volt, 3 phase and 220, 440 volt, 2 phase. Crocker-Wheeler Electric Mfg. Co., Ampere, N. J.



CROCKER-WHEELER MOTOR



G-E AUTOTRANSFORMER

Autotransformer

A new line of variable-voltage autotransformers to provide adjustable control of uninterrupted voltage and of small amounts of power has been announced. They are recommended for use in factories, laboratories, schools or for assembly with other equipment. They are designed for panel and bench mounting. Unit operates on low input power and low exciting current. Input circuit is connected to winding made up of spaced turns of the round conductor that are insulated by Formex enamel. Connection to output circuit is provided by carbon brush which is kept in contact with non-insulated portion of inside of winding. Each turn of conductor gives a different step in voltage. The dial on the cover is calibrated to indicate from 0 to 100 per cent of maximum output voltage. General Electric Co., Schenectady,

Insulating Varnish

Designated as S-110, this new insulating varnish is for application to electrical apparatus that must operate at abnormally high temperatures. When baked at 175-200° C it dries through the deepest winding and does not resoften when exposed to high operating temperatures, it is claimed. The dried film is strong, adhesive and flexible. Tests have shown that S-110 will stand operating temperatures at 250° C or higher. The Sterling Varnish Company, 122 Ohio River Blvd., Haysville, Pa.



WESTINGHOUSE LUMINAIRES

Luminaires

For lighting industrial fences and areas for protection against sabotage, two types of Fresnel luminaires are available. They are SF-180 and MF-180 for series and multiple circuits respectively. Units can be mounted on poles and building walls and consist of hood with socket and receptacle, mounting bracket, reflector and lens assembly. Hood is made of cast iron. Lower part of casting has a flange for watershed and breather to avoid creation of vacuum due to sudden cooling of luminaire by rain. Moistureproof felt gaskets form weatherproof and bugproof seal between hood and reflector. Units with side mounting plates are gasketed with graphitized asbestos. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Tuhing

Transparent Tenite tubing is a seamless tubing extruded in continuous lengths. Available in sizes ranging from \$\frac{1}{6}\$- to \$\frac{3}\$-in. in diameter. This new plastic tubing is unbreakable and may be bent, formed or curved to fit many conditions. Ends may be adjusted to standard flared fittings with same tools used for copper tubing. Large diameter tubing with wall thickness of .0625-in., can be threaded with standard thread-cutting tools. In sizes up to \$\frac{1}{2}\$-in. in diameter, with wall thickness of .035-in., tubing is available in long length coils. Tubing over \$\frac{1}{2}\$-in. in diameter is available in 12-ft. lengths. Eastman Kodak Co., 10 East 40th Street, N. Y.



EASTMAN KODAK TENITE TUBING



WESCO met 3-day deadline for 18 products

Steel Plant Started Production 60 Days Quicker; Saved 74 Paper Transactions.

A large Southwestern steel plant under construction suddenly needed \$14,000 worth of priority products. Altogether, 18 items from 6 manufacturers were required. A hurry call to the local WESCO House got fast action. WESCO delivered the complete order in 3 days. Deliveries by the manufacturers involved, would have taken a minimum of 60 days longer—in some cases 9 months.

Important, from an internal cost point of view, WESCO saved the customer the burdensome detail of handling 6 orders, 6 acknowledgments, 20 follow-ups, 12 shipments, 12 bills of lading, 12 invoices and 6 checks to issue.

Today's war plant building calls for hair-trigger speed in assembling and delivering material to meet crucial deadlines. WESCO speeds war production because each of its 79 Houses stocks great variety and quantities of apparatus and supplies and knows how to get things done for customers. Today that efficient service steps up war production. Tomorrow it will speed the reconstruction of business.

Westinghouse

ELECTRIC SUPPLY COMPANY

150 VARICK STREET . NEW YORK, N. Y.

WESCO SPEEDS WAR PRODUCTION

* A \$50,000 machine that would release 20 men for war production work stood idle for war production Best delivery from manufacturers the wire the following day.

* WESCO saved a 37-days' delay in a Naval Ammunition Depot by providing from stock, with engineers' approval, a type of transformer equally as efficient as a non-available type

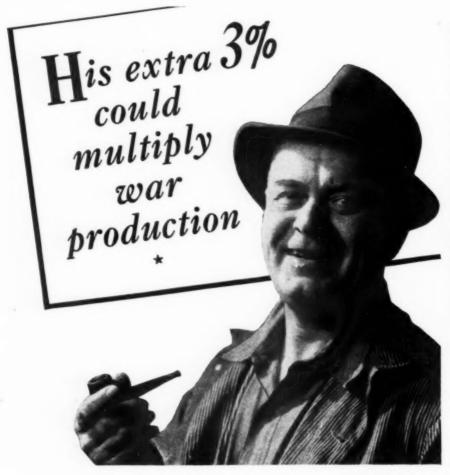
WESCO SERVES BUSINE'S

- * By maintaining perpetual inventory stock records.
- By extending credit to help finance
 jobs.

 * P.
- * By assembling all parts of an order in one shipment.

The name that means everything in electricity

A NATIONAL DISTRIBUTING ORGANIZATION WITH 79 BRANCHES



Suppose better illumination could multiply the production of our six million war workers by only 3%! That alone would add 360,000,000 man-hours to America's war effort this year. It's like adding 3% more workers.

Yet, 3% is a conservative estimate of what better illumination actually does to increase production of men and machines. At the same time, it reduces spoilage and promotes greater safety.

To answer the need for higher lighting intensities in large industrial interiors, Goodrich announces the new Highlite Reflector, shown at right. It provides good diffusion, minimizes glare, softens shadows and spreads a uniform high intensity of light over a large working area.

This high-bay reflector is but one of the complete Goodrich line which in-



cludes all approved RLM fixtures as well as hundreds of sizes and styles of incandescent and fluorescent fixtures to meet every industrial need.

Protecting vital plants with floodlighting—saving man-hours in production — Goodrich industrial fixtures are serving America's war effort everywhere.



Goodrich Highlite Reflector

SOLD ONLY THROUGH ELECTRICAL WHOLESALERS

GOODRICH SELECTRIC COMPANY H

GENERAL OFFICES AND FACTORY: 4602 BELLE PLAINE AVENUE, CHICAGO, ILL.

EQUIPMENT NEWS

FROM PAGE 921

Fluorescent Lighting

This new "RF" industrial fluorescent lighting fixture is known as the Compco. Some of the features claimed for this unit are low installation cost; no lamp starters; no "Strob"; efficient lighting and high output. Luminaires are available for one or two 85-watt R-F fluorescent lamps, 60 inches long. Dimensions of single lamp are 62 inches long and 13½ inches wide. Two lamp units are 62 inches long and 15 inches wide. Commercial Metal Products Co., 2251 W. St. Paul Ave., Chicago, Ill.



COMMERCIAL METAL INDUSTRIAL UNIT

Blackout Street Light

A blackout street light, which produces light equivalent to that from the flame of a single candle, has been developed. It is for use during air raids or other emergencies when street and highway lights must be put out. Based on specifications used by the British in their blackouts, the luminaire when spaced 100 feet apart and mounted at a height of 15 feet above the street, will produce a spread of light equal to starlight. The entire luminaire is painted black. In it is mounted a 10-watt incandescent lamp so concealed that the only illumination visible is through a narrow, circular piece of plastic around the side. This light cannot reach the eyes of aviators above because of a projecting black canopy at the top. General Electric Company, Schenectady, N. Y.



G-E BLACKOUT STREET LIGHT

Electrical Contracting, May 1942

WITH PROTECTIVE FLOODLIGHTING BY USING . . . automatic control



SANGAMO TIME-SWITCHES

When used in war production, industrial properties, such as: factory yards, building approaches, railroad sidings, transformer banks, and substations—all need protective floodlighting to safeguard America's war effort. For the dependable operation of floodlights, automatic control should be used—the kind that is provided by Sangamo Astronomic Dial Time-Switches. These time-switches change the operation of the lights daily to conform with sunset and sunrise. Investigate, then include the form of Sangamo Time-Switch best suited for your needs in your plans.

Form KAZ astronomic dial time-switch will continue to change automatically its setting in accordance with sun-set and sun-rise.



Current interruptions up to 10 hours will not stop Form VSWZ astronomic dial time-switch, nor affect its "on" and "off" settings.



SANGAMO ELECTRIC COMPANY SPRINGFIELD

TO HELP THE ELECTRICIAN GET MORE WORK DONE

Greenlee Tools



There's a Greenlee Bender for any of your bending jobs. Small hand benders and powerful hydraulic benders for conduit, pipe, and tubing from ½ to 4½-inch size. Greenlee Hydraulic Benders are easily operated by one man . . . save the cost of many manufactured bends and fittings . . . are compactly built in one unit . . . and are easily carried to the job and set up. The No. 770 Bender, shown here, will bend 1½ to 3-inch pipe while the No. 775 Bender will handle 3 to 4½-inch material.



The Greenlee Cable Puller will save many hours of work when pulling in cable. This handy tool clamps right on to the conduit through which cable is pulled . . . is easily carried to the job . . . can be set up in a jiffy . . and is easy for one man to operate with one or two hand cranks. This cable puller, with a maximum pull of 7500 pounds and with two speeds, can be clamped to 2 to 5-inch conduit.



Greenlee Knockout Punches and Cutters will enlarge holes in metal up to 1/8-inch thick without

CKOUT TOOLS

enlarge holes in metal up to ½s-inch thick without long tedious drilling and filing. A Knockout Cutter or Punch is inserted in a knockout or a small drilled hole, a few turns of the drive nut with an

ordinary wrench, and a hole up to $3\frac{1}{2}$ inches can be cut in $1\frac{1}{2}$ minutes or less.

HYDRAULIC PIPE PUSHERS
Greenlee Hydraulic Pipe Pushers eliminate digging long trenches, tearing up lawns, breaking through concrete, backfilling, and tamping when installing pipe underground. Only a short trench is required and one or two men can easily push the pipe by pumping the handles.

and one or two men can easily push the pip The No. 790 Pusher will push pipe from 1½ to 4½-inch size while the No. 795 Pusher will handle large drainage ducts, concrete sewer pipe, and pipe beyond 4 inches.



SEND FOR NEW GREENLEE CATALOG 33-E

Write for free copy of this valuable reference and buying guide to the complete line of Greenlee Tools for the Electrical worker.

1745 COLUMBIA AVE. ROCKFORD, ILLINOIS





FROM PAGE 941

Coding Control

The RECO motor driven coding control has been developed for use with sirens, alarms, signals. It has two signals. One signals a series of alarms in 15 cycles of raising and lowering tones during a period of two minutes. The other signals a steady "all clear" siren blast to two minutes. The control is supplied with automatic cut-off and push button start, for 110 volt 60 cycle current. Dimensions are 5- by 6½- by 4-in. Can be furnished in weatherproof cabinet if desired, with door lock, fuse block and push button. Similar controls can be supplied for signaling any codes desired. Reynolds Electric Co., 2650 W. Congress St., Chicago, Ill.



REYNOLDS CODING CONTROL

Outdoor Protector

This new outdoor protector is to safeguard watthour meters and secondaries of transformers against lightning. With a cutoff line to ground rating of 500 volts rms, the unit is for application on 3-phase circuits of from 110 to 575 volts. Discharge capacity is 20,000 amperes crest and gap breakdown on impulse is 2500 volts average. When installing, the protector ground load is grounded to meter case or conduit, equalizing meter coil and protector potentials. This eliminates possibility of a flashover from meter case to potential coils in meters which are insulated. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.



WESTINGHOUSE OUTDOOR PROTECTOR

GAIN vital production-hours . . . CONSERVE vital materials . . . by using



CUTS POWER LOSSES... DELIVERS FULL VOLTAGE

Unique new construction of the L. V. D. System cuts down power losses and delivers full voltage power at point of load. L. V. D. design, based on exhaustive electrical tests, easily withstands mechanical stresses that may result from short circuit currents as high as 100,000 R. M. S. amperes.

L. V. D. Systems and unit parts are furnished completely assembled ready for installation in minimum time. Blueprints and detailed instruction sheets accompany each shipment. Rigid structure permits installation of hangers at any point on the enclosure, providing wide latitude in installation for varying types of building construction. Being built entirely of materials not subject to deterioration L. V. D. Systems require little or no maintenance, easily withstand overloads possible in busy war industries.

TRUMBULL

ENCLOSED BUSBAR DISTRIBUTION SYSTEM

Gaining a month, a week . . . even a day . . . on the schedule of your new plant extension, or on power distribution changes in your present production departments, is no longer a matter of costs, it may be a matter of lives.

Trumbull Enclosed Bushar Distribution Systems are increasingly recognized as one of the most important time-saving, production-speeding developments available to America's war industries. Completely standardized . . . eliminating the need for time costly special engineering . . . installed in interconnecting sections "like running a line of railroad track" . . . they will enable your contractor to have power at the machines far ahead of ordinary schedules.

L. V. D. (LOW VOLTAGE DROP) SYSTEM for distribution of electric power in main circuits. Providing connection between transformers and switch-board for main plant feeders, main risers in office buildings, feeders to Flex-A-Power runs, secondary network feeders and current supply to groups of electrically operated machines. (See additional information in paragraph at left).

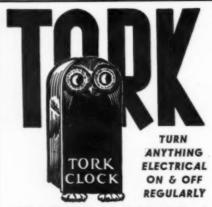
TRUMBULL FLEX-A-POWER for distribution of electric power in secondary circuits to point of load. Plug-in connections to machine load are made through FLEX-A-PLUGS which are enclosed self-contained protective devices and disconnects.

TROLLEY CLOSUR SYSTEM AND CONNECTORS safely supply power to portable electrically driven tools, hoists, etc.

All above systems fully described in detail in Trumbullaid
Bulletin No. 165.



OTHER FACTORIES AT NORWOOD (CINN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES — TRENTON, N. J. (PORCELAIN)



FOUR LITTLE GIANT MODELS

Self-Starting

Ratchet Setting Dial; One Minute Accuracy; Hinged Cover; Lots of Room; 12 Knock-outs; L R.P.M. Indicator



			2300
191 A-Single	Pole, 20	Amp	\$13.00
1191 -Single	Pole, 35	Amp	14.00
962 A-Double	Pole, 20	A. ea	15.00
1962 —Double	Pole, 3	5 A. ea	16.00
Apt. House, 2	-S.P. Circ	uits	25.00
Sixty Minute	and Fou	r Hour T	imers

CARRIED BY JOBBERS EVERYWHERE

The TORK CLOCK CO., Inc., Mount Vernon, New York

Mist, Rain WON'T CRACK



MOTION PICTURE PRODUCTION . SOUND REPRODUCTION

SPORTS LIGHTING & GENERAL SERVICE



IFROM PAGE 961

Transformer

This safety transformer provides for two 32 volt a.c. extension lines to give light for men who work under conditions in which explosive gases or vapors exist. This also applies to cases where inflammable materials are stored or in process, and where possibility of high voltage spark may cause damage. It is a portable instrument that may be carried about the plant and plugged into any 110 volt a.c. circuit. It is insulated and approved by Underwriters' Laboratories. Mounted in one end of the unit are dual polarized secondary receptacles for two 32 volt a.c. extension lines. Acme Electric & Mfg. Co., Cuba, N. Y.



ACME SAFETY TRANSFORMER

Protective Lighting Bracket

A new 20-inch right-angle-bend bracket for use in protective lighting, applications is available. It is particularly adapted to plants located in congested areas, as bracket can be mounted directly on building. This bracket, equipped with a Form G-E 79R Novalux luminaire and a 500-watt lamp, will provide a well-lighted area between building and street. Brackets are usually mounted 22 to 28 feet above pavement and approximately 150 feet apart. General Electric Co., Schenectady, N. Y.



G-E LIGHTING BRACKET

0



THE continuous "blinking" of a burned-out lamp, caused by the starter's futile efforts to re-light it, has always been a bothersome fluorescent problem.

But now Hygrade has found the answer—and in the most effective way possible.

For the Hygrade Premium Mirastat is unique among all standard starters in that it automatically cuts out a dead lamp as soon as its useful life is ended.

This exclusive Hygrade device stops flickering almost immediately—checking starter abuse, averting costly time-outs for repairs.

What's more, it prevents the usual waste of current and needless overloading of the ballast. Once a lamp goes, the only current used in the starter is less than one watt required to maintain the cut-out feature!

For efficient, economical starter performance, you can't find the equal of the Premium Mirastat anywhere. For complete information, write Dept. MEC5, Hygrade Sylvania Corporation, Salem, Mass.

All Mirastat Starters are approved by Underwriters' Laboratories, Inc.



A COMPLETE LINE OF BETTER SOCKETS

Here's an array of Hygrade Sockets designed to fit not only Hygrade Lamps and Fixtures, but those of other leading manufacturers, too. You'll find it pays to recommend them because they embody four definite advantages, not found in sockets of any other make:

- They're stronger, more durable, all over.
- They're made so they never break at the lamp insertion point.
- They're designed so the lamps are easy to insert and can't fall out.
- They're built so starters always make positive contact with one easy twist.

"Everything that's Finest in Fluorescent"

HYGRADE SYLVANIA CORPORATION

SALEM, MASS.

Manufacturers of Hygrade Incandescent Lamps, Fluorescent Lamps, Fixtures, Starters, Sockets and Sylvania Radio Tubes

42



Taking It without Burning Up

Rush production . . . "1942 is the decisive year" . . . Peak load day after day in this munitions plant! Yet there is maximum protection against any stray tongue of flame licking at explosives—because the current for power, lighting, and control is carried in Deltabeston wire and cable.

Deltabeston is non-inflammable; and it is built to stand peak load operation, 24 hours a day, year 'round. That's why you'll find Deltabeston wire and cable chosen for munition factories and other installations where absolute safety at constant peak load is necessary.

If you'd like to know more about Deltabeston and its extra safety and dependability, call your nearest G-E Merchandise Distributor or a branch of the Graybar Electric Company. Or write to Section Y523-8, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.





FROM PAGE 981

Drying Lamp

A new 100-watt infra-red drying lamp has been developed for use where relatively low heat intensities are required in quickly drying paints and heating other materials. It supplements the 250, 500 and 1000-watt drying lamps. It does not incorporate a self-contained reflector, but must be used with a separate reflector of Alzak aluminum or gold-plated metal. Westinghouse Lamp Electric Co., Schenectady, N. Y.

Switchboards

A new line of control center switch-boards has been added to this motor control center line. It consists of an assorted assembly of switch or circuit breaker units, 30 to 200 ampere capacity, in vertical section troughs, in which power is supplied through the busbar. These assemblies may be installed in one central point and immediate connection made with the load by inserting switch or circuit breaker units under the busbars in the power troughs. These assemblies provide flexibility and convertibility and all interior parts are accessible from the front. The Trumbull Electric Co., Plainville, Conn.





Fluorescent Starter

A new line of fluorescent lamp starters has been announced. They are designed to protect ballast and starter and eliminate flashing of failed lamps. They are called Premium Mirastat Starters. Automatically opening circuit when a lamp fails, the Premium Mirastats are especially suitable for installations that make immediate replacement of a burned-out lamp impractical. In addition to the special feature, they contain all the regular features of the standard Mirastats. Hygrade Sylvania Corp., Salem,



Wiremold V-Type Cover LINE - O - LAMPS with porcelain enamel reflectors for industrial service. (Design 11)

Fluorescent opened the eyes of industrial executives to an entirely new order of work-lighting efficiency. Not merely better light, but light four or five times as good . . . clean, cool daylight illumination of an intensity that enables workers to work faster with less fatigue and less spoilage.

That, in a few words, is why you now see war plants brilliant with fluorescent lighting all through the night. That kind of work light rates a high priority.

You can install it in YOUR plant . . . very easily, at low cost and without disrupting work schedules . . . by using the Wiremold "3000" System . . . the ONE simple, basic wiring and lighting system that efficiently provides for practically all fluorescent lighting needs.



WIREMOLD

"3000" SYSTEM

FLUORESCENT LIGHTING



THE WIREMOLD COMPANY, HARTFORD, CONN.

STEP UP LIGHTING to SPEED UP PRODUCTION



FLUORESCENT ADVISORY COMMITTEE FORMED

A fluorescent lighting fixtures committee has been formed to represent the industry under the Bureau of Industry Advisory Committees of the War Production Board.

J. L. Haynes, chief of the building materials branch is the Government presiding officer. The members are: Arthur Miller, vice president, The Miller Co., Meriden, Conn.; W. P. Lowell, Jr., Hygrade Sylvania Co., Salem, Mass.; Joseph Markel, president, Markel Electric Products, Inc., Buffalo, N. Y.; Nathan H. Eglowstein, president, Fluores-O-Lite Manufacturing Co., Newark, N. J.; E. C. Huerkamp, Westinghouse Electric & Manufacturing Co., Cleveland, Ohio; Ward Harrison, General Electric Co., Cleveland, Ohio; A. K. Wakefield, president, F. W. Wakefield Brass Co., Vermilion, Ohio; Thomas G. Beckett, president, Beckett Electric Co., Inc., Dallas, Tex.; R. W. Staud, Benjamin Electric Manufacturing Co., Des Plaines, Ill.; and Leon F. Moore, general sales manager, Electrical Products Consolidated, Denver, Colo.

E.E.I. POWER
CONFERENCE AT CHICAGO

Developing the most effective means of guiding commercial thought, applying facilities and technical skill in the direct effort of winning the war, was the theme of the Ninth Annual General Power Conference of the Edison Electric Institute at Chicago March 24–26, 1942.

The general subjects of power rationing, war emergency problems, advertising, dealer and home service problems were discussed at the opening sessions.

Speaking at the second day's session, E. A. Brand, Buffalo Niagara and Eastern Power Corp., Buffalo, N. Y. called for a flexibility of mind, equipment and tools to effectively utilize existing electrical facilities. "Proper use

of instruments by utility men and contractors in making plant electrical surveys," he said, "will help customers increase their system capacity without the need for added feeders or use of vital materials."

J. F. Porter, Jr., Kansas City Power & Light Co., told of the use of CNX in the wiring of more than 200 homes in the Kansas City area, as one means of conserving vital materials in Victory Housing. Speaking on the conversion of civilian to war production, W. H. Wheeler, Jr., Chief, Contract Distribution Branch, WPB, asked industry to exert individual initiative and ingenuity to find its place in our war effort.

A comprehensive discussion of blackout methods and procedure was given by Col. M. C. Mapes, Chief, Technical Section O.C.D. He predicted total blackouts only in strategic areas at present and revealed the harrowing problem that street lights and industrial blast furnaces present.

Light as a tool to help win the war, was the subject of an entire session. Prof. J. O. Kraehenbuehl, University of

WHEN PRESIDENTS Orville R. Nichols (left) of the Milwaukee Chapter NECA, and Robert J. Nickles, of the Wisconsin Electrical Association get together for a chat you can bet your small change they're discussing problems of members of their respective groups.

Illinois, discussed light for production. "Light becomes the sentry of industry today," said E. R. Coffey, FBI, Washington, D. C., as he warned that small sub-contracting plants must have protective systems, as they will be the natural target of saboteurs.

Regulation of fluorescent lamp production, possible curtailment of RF units and strict priorities on fluorescent fixtures were predicted by Don M. Julien, Footer & Davies, Inc., Cleveland.

Civilian defense and wartime utility operations in England were discussed in a highly interesting illustrated talk by D. M. DeBard, vice-president, Stone & Webster Service, Corp., New York.

The final session was devoted to a discussion of customer good will, residential usage of electricity and electrical appliances in defense housing. At the closing luncheon session, Charles W. Kellogg, president, E.E.I., spoke on "Maintaining the National Life" and Frank W. Lovejoy, Socony-Vacuum Oil Co., discussed "Selling—A Bulwark for Enterprise in War and Peace."

REA ALLOWED 100 TONS MORE COPPER

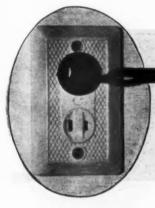
Only 100 tons of copper in addition to that already on hand will be allotted to the Rural Electrification Administration to complete projects under way on December 5th, according to a recent ruling by WPB.

Last December the former Supply Priorities and Allocations Board authorized the then Office of Production Management to allocate to REA 1,500 tons of copper per month up to a total of not more than 10,500 tons. It provided that such copper should be used on certain projects listed in two Groups (A and B) that were then more than 40 per cent complete. It provided also that projects less than 40 per cent complete should be reviewed, and those substantially under way should be completed.

REA has since then received a total of 7,200 tons of copper. While this is 3,300 tons short of the maximum permitted under the SPAB policy, the copper situation has become even more acute than it was last December and the War Production Board has now decided that the additional copper cannot be allocated.

The copper needs of the projects listed in Groups A and B have already been provided for.

In addition, 34 other projects were over 40 per cent complete last December 5th. They did not appear in the A and B Groups because the REA lists were



Appeal TO HOME OWNERS FOR SAFETY AND DURABILITY . . .



Read what this recent builder-owner

Says ...

"In selecting materials for my home, which was just completed, I wanted to use the best materials available.

"Porcelain boxes appealed to me more than other types due to the fact I wanted to take advantage of porcelain outlet boxes and therefore do my part toward national defense.

"I was convinced of the longevity and positive insulation qualities of porcelain outlet boxes. I feel now that our home is wired the safest electrically." The Contractor for the home referred to at left says: "In all my experience with installing porcelain boxes I have never had the least trouble installing them but I have had a lot of satisfaction knowing my work was safely put in when I left the job for inspection." The plasterer said: "These boxes are very easy to plaster up to and give a good fit when finished." Porcelain devices are installed with ease and speed. Porcelain plates are safe and attractive.

Materials for modern porcelain protected wiring systems may be obtained through your wholesaler and are manufactured by the companies listed below.

* ILLINOIS ELECTRIC PORCELAIN CO. ** KNOX PORCELAIN CORPORATION ** Macomb. III ** Nox Porcelain Corporation ** Knox porcelain Corporation ** Nox porcelain Corporation ** Nox porcelain Corporation ** Nox porcelain Corporation ** Forcelain Products. Incorporated ** Findlay, Ohio

In the Hews

[FROM PAGE 102]

prepared as of October 31, whereas the SPAB policy was announced as of December 5. Approximately 650 tons of copper are required to complete these 34 projects, if 920 tons of steel conductor is used in substitution for copper.

While the SPAB policy did not commit OPM to make copper available for project not included in the A and B groups, nevertheless WPB took the position that the SPAB policy has been generally regarded as giving assurance that any projects that were 40 per cent complete at the time of the ruling would be given sufficient materials to complete the projects.

In order to make possible the completion of these 34 projects, WPB directed that 550 tons of copper now in REA's possession be diverted from projects not yet started and that an additional 100 tons be allocated to REA, thus making available the 650 tons of copper necessary to complete these projects.

Provision was also made for partial completion of another group of projects which were in various stages of completion on February 20, the last date for which data were available when a check was made.

WPB has decided that the copper on hand for this group may be used for such of those projects as are approved by the power branch of the WPB but that no more copper may be allocated to this group, which is in addition to those from which the 550 tons will be diverted.

MANILA ROPE WANTED FOR INSULATION

The Industrial Salvage Section of the Bureau of Industrial Conservation has issued an urgent appeal for the salvage of old manila rope vitally needed for plants manufacturing insulating papers. Representatives of six plants, which produce more than 75 per cent of the nation's supply of insulating papers have declared that they had on hand only a few weeks' supply of No. 1 old manila rope, from which the papers are made. The insulating material is used in electrical apparatus such as motors, generators and transformers, where the strength of manila fibre paper permits a reduction in the size of the apparatus and promotes maximum speed in the application of the insulation.

In addition, the paper is used for the manufacture of telephone cables, parachute flares and a number of other direct or indirect military purposes. Much of the existing scarcity of manila rope re-



NEW OFFICERS of the Minnesota Electrical Association, elected at the annual meeting held in Minneapolis during the Electrical Convention week of Feb. 22, are (l. to. r.) Wm. A. Ritt, secretary-treasurer, St. Paul; Larry Shaeffer, president, Pipestone and Eric Nylund, vice-bresident, Duluth,

quired for the production of the insulating papers is due to the cutting off of supplies of rope from the Philippines and from Europe. Consequently it is essential that all old manila rope not in use be returned to production. Dealers are available throughout the country to handle the rope and move it promptly to the mills which need it.

ST. LOUIS TRAINS APPRENTICES

A set of standards for training electrician apprentices has recently been developed by a joint committee representing the St. Louis Chapter, NECA, and Local Union No. 1, IBEW.

The standards are now in effect and 35 young men are attending one four-hour session per week at a vocational training school. The balance of the week they are given practical training on the job. The term of apprenticeship covers 8,000 hours of reasonably continuous employment, not to exceed five calendar years, in aggregate. This is to be supplemented with a minimum of 576 hours of related class-room instruction, with a minimum of 144 hours instruction per year.

The work schedule follows the following pattern: residential—approximately 1500 hours (9 months); commercial—approximately 4000 hours (2 years); industrial—approximately 2000 hours (1 year); and specialized work—approximately 500 hours (3 months). The wage rate conforms to the existing agreement and at present varies from \$0.47 per hour for the first 1000 hours to \$1.15 per hour for the eighth 1000 hours of employment.

The apprenticeship plan is under the careful administration of the St. Louis, Mo., Electrician Joint Apprenticeship



"No wonder paw has been actin' so dopey—this is an infra-red lamp they gave me!"

FIGHT WITH LIGHT IT MAY BE THE MARGIN OF VICTORY

Better lighting - means better seeing, saves time, conserves energy, fewer accidents and quicker work -- RESULT -- increased production so vital to victory.

Lighting Products fluorescent equipment is built for strength - durability with simplified installation features and will stand up under the most severe service requirements. . . .

Our engineering service is at your disposal. Engineers maintained in principal cities. Write for complete lighting catalog today.

LIGHTING PRODUCTS INCORPORATED

FOUR POINT ECONOMY—



Above: Type CFT, threephase, outdoor-type, aircooled, general-purpose transformer.

Below: Type CF. Single-phase, outdoor-type, air-cooled, general purpose transformer.



LOW INITIAL INVESTMENT

> EASY TO INSTALL

> > 3

MINIMUM MAINTENANCE

EFFICIENT IN OPERATION

Whenever it is desired to obtain a low-voltage supply from a higher voltage circuit you will find AmerTran Type "CF" Air-Cooled Transformers both economical and convenient to use. These moderately priced units may be installed wherever they are needed—either outdoors or indoors*—without the necessity of oil, fire-proof vaults or enclosures. All sizes are equipped with either conduit fittings or a built-in junction box to facilitate installation, and both single-phase and polyphase types are furnished as a single unit. Available in capacities up to 100 Kva. and for potentials up to 2400 volts, all ratings offer low initial investment, minimum installation and maintenance expense, and low operating cost. Let us send data on equipment to meet your needs. Ask for bulletin 1116A.

* Units rated 15 Kva. and larger for indoor service only.

Type "CF" Applications

- Stepping down power circuit voltage to 115/230 volts for lights, small motors or heating elements. In this way advantage may be taken of lower power rates for low-voltage loads.
- 2. Obtaining a 3-wire circuit from a 2-wire system.
- Changing from 3 phase to 2 phase, or vice versa, on a power system.
- Obtaining low voltage for heating, welding, 32-volt tools, special lighting, testing, etc.
- 5. Balancing load on 3-phase systems.
- 6. Insulating one circuit from
- 7. Distributing power at 600 volts or less.
- 8. Reducing light flicker.
- Obtaining special voltages to permit efficient operation of equipment.

PRODUCTS

American Transformer Co. manufactures transformers for every industrial, electronic and laboratory

application in sizes up to

10,000 Kva and for potentials up to 132 Kv. Other

products: voltage regula-

tors, test sets, rectifiers.

AMERICAN TRANSFORMER COMPANY

178 Emmet St.

Newark, N. J.

AMERIRAN

Manufactured Since 1901 at Newark, N. J.

RANSFORMERS



[FROM PAGE 104]

Committee for the Electrical Construction Industry. This committee is composed of six members: Carl I. Schaeffer, president; R. E. Vierheller, business manager and Charles P. Bobe, director of the St. Louis Chapter, NECA; and Frank W. Jacobs, president; J. A. Morrell, business manager and August Loepker of the Local Union No. 1, IBEW.

DAVIS ON COAST

Laurence W. Davis, managing director of NECA, made a flying trip to the West Coast during the latter part of April. Strengthening of the national organization in view of the large-scale construction projects being built throughout the country on which electrical contractors are engaged was the primary purpose of his trip. Leaving New York April 18, his first stop was at Spokane for a day, April 21, Seattle April 23, Portland April 24, San Francisco and Bay region April 25–29, and Los Angeles April 30 and May 1.

In the Northwest he was accompanied by Sam Hepler, NECA executive committeeman for Division 8; in San Francisco Bay region by Clyde L. Chamblin, past president and member of the National Labor committee for Region 9; and in Los Angeles, A. L. Stone, executive committeeman for Region 9. Meetings were called by the contractors' organizations in each city to discuss national political and labor situations.

CHICAGO E.M.E. STUDY PLANT PROBLEMS

Recognizing the key position held by plant maintenance engineers in today's war industries, the Chicago Electrical Maintenance Engineers organization has geared its program to help industry meet some of its wartime problems.

The subjects chosen for the monthly meetings are selected to promote the dissemination of information and experience covering plant electrical maintenance and equipment problems; electrical equipment that might facilitate and speed up production processes; plant protection; and a host of relevant subjects. All are designed to help the maintenance man solve his own particular problems.

Future meetings will feature a session of open discussion where manufacturers' representatives, wholesalers



How a "Wall of Light" Blocks Plant Sabotage

Here is another substantial contribution by our lighting engineers to sustain and safeguard America's 24-hour war production schedules. It's the Westinghouse TypeSG-10 Refractolux Luminaire.

This new Refractolux combines a steel-protected silvered glass reflector with better methods of light control. When installed on the sides of industrial plants or on properly located poles, the units produce a protective "wall" of intense light. Trespassers are immediately revealed as they approach plant boundaries, fences, storage areas or production centers.

We've designed this high-candlepower luminaire to assure effective, night-after-night protective lighting. SG-10 is typical of Westinghouse engineered seeing—the combination of scientifically designed fixtures expertly applied to achieve the best visibility conditions. Full data is available in our new Protective Lighting Planning Book, B-3085. Write Westinghouse Electric & Mfg. Company, Edgewater Park, Cleveland, O.

The SG-10 consists of a canopy, high or low voltage type for internal or external wiring; a socket, mogul multiple or series type; a sheet steel housing that protects the glass reflector; a silvered glass reflector, cushion-mounted to absorb shock; and either a refractor or globe. Canopies, wiring and mounting arrangements and glassware are all interchangeable. A porcelain enameled shield, with refractor type units, redirects light from the pole side, and a hand-operated toggle latch releases the hinged globe or refractor for safe, easy maintenance.







Factories
Arsenals
Military Depots
Plant Expansions
—all new construction vital to Victory
in a production war.



You're supplying the Power and Light. What about the safety of this construction and the workers? That calls for "Electrical Signaling Equipment" — more important than ever to-day. These make your service complete.

They provide protection against Fire, Sabotage, Air Raids. They're vital to speed and efficient communication during and after construction. Nothing must interrupt the production schedules of our Victory Program.



Holtzer-Cabot's 67 years experience can help you plan installations "tailored-to-fit" every job! Consult our engineers! Send for folders on Air Raid Equipment, Fire Alarm and Watchman's Report Systems—Clock and Telephones, too!

Protect and speed America's military, industrial and civilian defense operations. Remember the "Signals" on every job. Be alert to every demand in this National Emergency.

* * * * *

Write EC Research and Specify
Your Needs

The Holtzer-Cabot Electric Company
125 AMORY STREET, BOSTON, MASS.
Offices in twincipal Cities.



In the Hews

FROM PAGE 106

and contractors may exchange information with the maintenance engineers so as to promote the greatest degree of mutual helpfulness.

Typical subjects discussed at the E.M.E. meetings are:

"Modern Development for Reducing Transformer Maintenance"—G. W. Clothier, Allis-Chalmers Mfg. Co.

"How to Secure Adjustable Speed"—
A. M. MacCutcheon, Reliance Electric & Engineering Co.

"Counter - Sabotage in Industrial Plants"—A. H. Johnson, Special Agent, F.B.I. Chicago.

"Thy-mo-trol"—S. D. Fendley, Gen-

eral Electric Company.

Other subjects in similar categories will be on future programs. Under present conditions a long range schedule is considered unwise, since flexibility is necessary and each monthly subject is chosen with prime consideration given to timeliness and application to war industries.

INSPECTORS SCHOOL URGES SAFETY VIGILANCE

Electrical inspectors are responsible for making and enforcing laws that govern safe and efficient power usage; they are, therefore, the ones who must suggest whatever changes should be made to comply with wartime shortages of essential materials. Inspectors must also be equipped with engineering knowledge; must understand the problems



BOOKS AND FORMS are carefully scrutinized at the Minnesota Electrical Council Display during the recent convention in Minneapolis. Studious chap is John C. Claussen, Slayton, Minn., contractor.

Keep Motors Humming on 24 Hour PRODUCTION SCHEDULES



WARE Hi-Lag FUSES are certified to comply — Federal Specification WF - 803a, Type II. Time-lag 2 to 5 times normal current handles heavy starting overloads and operating current surges.

Low Contact Resistance, ends fuse over-heating worries.

Larger, Heavier internal construction assures continuous uninterrupted service.

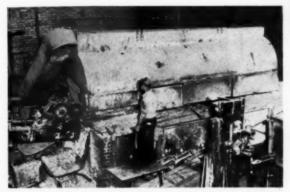
Write for Brochure and blowing time charts APPROVED BY UNDERWRITERS

WARE BROTHERS 1410 W. Lake St. Chicago, III

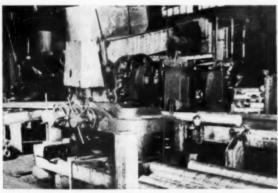
WARE Renewable



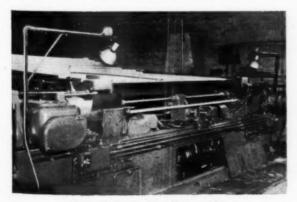
G-E Conduit in exclusive G-E "Pickling" machine



G-E White leaving hot-dipped galvanizing tank



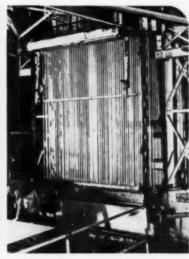
G-E White moving through straightening machine



G-E Conduit on threading machine



G-E Black leaving enamel tank



G-E White entering Glyptal tank

Processes Behind G-E CONDUIT Provide High Quality

No. 9 Concluding Ad of a Series Men and Processes Behind G-E Conduit

G-E Rigid Conduit is designed and made to give wiring systems the utmost protection. Both G-E White and G-E Black are made from easy bending, open hearth steel tubing expertly processed by skilled, experienced workmen. The hot-dipped galvanizing of the tube for G-E White and the tough, elastic enamelling for G-E Black make each a leader in its class.

Craftsmen, proud of their work, handle all processes in the manufacture of G-E Conduit. The processes themselves have been developed through long experience and research. The pickling, the enamelling of G-E Black and the hot-dipped galvanizing, the straightening, the Glyptal coating of G-E White and the threading . . . all are modern processes which produce the finest conduit. Only the best of new materials are used. Detailed specifications are accurately met. Inspections are made daily of equipment, processes and materials.

For further information about G-E Conduit see the nearest G-E Merchandise Distributor or write to Section C521-8, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.



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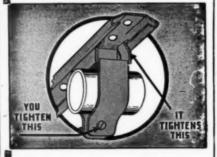
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THE CLEVELAND CONDUIT HANGER



Gives You a Quicker Easier Installation

"CONVINCE YOURSELP"

"Send for Circular Giving Full Detalls"

THE CLEVELAND SWITCHBOARD CO. 2927 E. 79 St. Cleveland, Ohlo confronting contractors, journeymen and jobbers, and be prepared to help solve them. Furthermore, electrical inspectors must be acquainted with approved substitutes for supplies now unobtainable, and exercise unusual vigilance to protect public safety by eliminating hazardous installation practices and substandard materials.

These were the messages driven home to members of the Rocky Mountain Chapter, Western Section, International Association of Electrical Inspectors at Denver, March 26 and 27, when the body conducted its Eighth Annual Inspectors School, with registrants from Colorado, New Mexico, South Dakota, Utah and Wyoming. The event was jointly sponsored by the Rocky Mountain Chapter IAEI and the Electrical League.

Inspectors were told by T. M. Foulk, chairman of the Denver Chapter, RMEL, that the "new order" applying to the electrical industry will not be merely "for the duration" but probably for all time to come, pointing out that the shortage of man-power and materials called for adjustments in the industry that will be permanent. He declared that new reserves of ingenuity and individual initiative must be found to cope with conditions as they now exist and will prevail in the future.

Substitute materials and alternate specifications were explained by W. J. Alcock, service engineer for the Underwriters' Laboratory. Victor H. Tousley, field engineer of the NFPA, advised inspectors that, for the duration of the war, tables on type "R" wire in the 1937 Code will be used, emphasizing that contractors can make no new installations or extensions, but that most needed replacements can be secured if requisitions are properly routed through established rationing channels.

Marian M. Wilson, Rapid City South Dakota, was elected president for the ensuing year, succeeding George R. Hubbard, Boulder, Colo., who became head of the executive committee. Other new officers are: Charles B. Farrah, Denver, first vice chairman; W. C. Quandt, Pueblo, Colo., second vice chairman; V. C. Moulton, secretary-Treasurer. The 1942–43 executive committee, besides Mr. .Hubbard, is composed of: William H. Hart, Pueblo, Colo.; T. P. Treadwell, Fort Collins, Colo.; V. D. Markham, Colorado Springs, Colo.; H. H. Brown, Casper, Wyo.; Lester B. Johnson, Salt Lake City, Utah; Harold Vaughan, Denver; Leslie Lippard, Salida, Colo.; E. P. Hodges, Denver, and John A. Baker, Denver.

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Are outlet boxes your problem—or maybe sockets—or plugs—or any one of a dozen other items? Whatever your question, you'll find it answered in Electrical Buyers Reference. 31 manufacturers of wiring devices and supplies have told their product story in "Briefalog" form in the 1942 edition—giving you all the information necessary to help you compare, select, specify and buy.

And in addition to the Briefalogs listed on this page, 235 other manufacturers of electrical and allied equipment have included their condensed catalogs in this reference.

Get into the habit of using E.B.R. regularly—make it your first source of information—and you'll save a lot of valuable time!



Accurate Manufacturing Co. Adam Electric Co., Frank Adapti Co. Appleton Electric Co. Atlantic Conduit Fittings Co. Austin Co., M. B. Clifton Mfg. Co. Couch Co., S. H. Cutler-Hammer, Inc. Fullman Manufacturing Co. General Electric Co. General Electric Supply Corp. Graybar Electric Co. Heron Electric Sales Corp. Ideal Commutator Dresser Co. Illinois Electric Porcelain Co. Johns-Manville Kees Manufacturing Co., F. D. Killark Electric Manufacturing Co. M & W Electric Mfg. Co. McGill Mfg. Co. Metropolitan Device Corp. Okonite Co. Ruberoid Co. Sherman Manufacturing Co., H. B. Steel City Electric Co. Trumbull Electric Manufacturing Co. United States Rubber Co. Van Cleef Brothers Victory Switch Co. Westinghouse Electric Supply Co.

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A McGraw-Hill Publication

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Electrical Contracting, May 1942

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IMPORTANT NOTE: Automasic Electric P-A-X's and Intercom Systems are available in limited quantities to organizations whose work is tied into the war effort. Priority ratings of A-9 or better are essential.



P-A-X systems pro-vide dial service and secret connections for ten stations or more. Designed for private service only, they do not connect with public tele-phone systems.

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On the Hews

FROM PAGE 1101

MISSOURI-KANSAS IAEI CONVENES

The role of the electrical inspector under war conditions, code supplements and material substitutions, were thoroughly discussed by members of the Missouri-Kansas Chapter IAEI when they met recently for their ninth annual convention at Chanute, Kansas.

The usual reports and discussions on various code articles were supplemented by several exceptionally interesting addresses on subjects vital to inspectors. Victor H. Tousley, National secretarytreasurer, IAEI, discussed the proposed changes in the 1940 NEC and reported on the recent meetings of the Article Committees of the Electrical Committee, NFPA, at New York. He told of the decision to issue a supplement to the 1940 code instead of printing a 1943 edition: discussed the Section 3004 amendment substituting 1937 wire tables for the 1940 group and commented on the limited use of CNX in defense emergency buildings and the approval of semiinsulated neutral conductors such as types SBW and WP instead of bare neutral wiring.

Fluorescent lighting troubles were comprehensively covered by E. C. Coleman, G. E. Lamp Division, Kansas City. A. J. Trovillo, assistant secretary, Underwriters Laboratories, Inc., Chicago, outlined the substitution of materials and emergency alternates for the duration of the war.

The electrical inspectors qualifica-tions, responsibilities and the electrical contractors attitude toward the inspector were stressed in enlightening talks by E. J. Stewart, Chief Engineer, Kansas Inspection Bureau, Topeka and J. E. Launder, president, Independent Electric Machinery Co., Kansas City, Mo:

At the annual business session, the following officers were elected: chairman, Harold A. Stahl; Springfield, Mo.; first vice-president, W. C. Boon, Topeka, Kansas; second vice-chairman A. Penn Denton, Kansas City, Mo.; secretarytreasurer, M. V. Reagan, Kansas City, Mo. Members of the Executive Committee are C. W. Hack, Topeka, Kansas, immediate past-chairman; R. A. Yorke, Chanute, Kansas, active member; and S. W. Fries, Kansas City, Mo., associate member.

A resolution pledging active industrial and collective cooperation with our government in its war effort passed and copies sent to the governors of Kansas and Missouri.

The 1943 convention will be held in Kansas City, Mo.

Simplifies speeds up *improves* THE PLANNING AND SPECIFYING OF ELECTRICAL WIRING ELECTRIC JOBS

SPECIFIC Now you can make sure that plans and specifications tell all and tell it clearlyto help sell the job, and cut down losses from misunderstandings about what's to be done and how it's to be done. This new book gives a simple guiding system tells in the most concise, direct manner what steps to follow, what data to use—a valuable tool for designers, estimators and contractors.

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ELECTRICAL WIRING SPECIFICATIONS

By EARL WHITEHORNE and the Editorial Staff of Electrical Contracting

181 pages, 6 x 9, 48 illustrations, \$2.50

This book gives you a step-by-step procedure for drawing up wiring plans and specifications that will do a better selling job and aid efficient construction. Covers

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wiring for light, power and signaling—in industrial, commercial, farm, and residential buildings—outlining a simple way of develop-ing specifications, and rules giving guiding rules of the National Electrical Code, standards, engineering data, and diagrams to simplify your work.

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WAR MESSAGE

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U. S. Defense BONDS * STAMPS

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Electrical Contracting, May 1942



-in the COMPLETE line"

All in one catalog, for your handy selection — every good type of tee connector... Each one carefully designed and tested, and manufactured under rigid engineering supervision.

Penn-Union Type HFM, with one-bolt or 2-bolt hinged clamp for the main. One or more branches can be connected afterward. Multi-slit tapered sleeve assures permanent grip on branch.





Penn-Union Hinged E-Z Tee takes a wide range of branch sizes. One-piece design makes installation easy. Tap connections can be made at any time.



Clamp Type Tees for all sizes of tubing and cable—a complete line. Machined contact surfaces.

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—for connecting flat bar, run
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Also "general utility" tees
that take a wide range of
conductor sizes.



Penn - Union
E - Z. Tee is
ideal for accommodating a large range
of conductor sizes on both
the main and branch. Will
not loosen. 2, 3 or 4-post.

Penn-Union fittings are preferred by utilities, industrials, electrical manufacturers, contractors—because they have found that Penn-Union on a fitting is their best guarantee of Dependability.

PENN-UNION
ELECTRIC CORPORATION
ERIE, PA. Sold by Leading Jobbers





[FROM PAGE 112]

LORD ELECTRIC FIRST IN PRODUCTION DRIVE

The first electrical construction firm officially participating in the War Production Drive campaign is the Lord Electric Company, Inc. of New York, according to an announcement by the War Production Board.

Lord Electric was named with the first 500 war plants to set up volunteer labor - management committees and launch War Production Drives under the plan initiated by Donald M. Nelson on March 2. The 500 mentioned included only those companies whose formal reports had been received and processed at the drive headquarters.

CONTRACTORS-DEALERS MEET AT ABERDEEN, S. D.

A special program for electrical contractors and dealers was held in connection with the North and South Dakota Central Station Conference at Ward Hotel, Aberdeen, South Dakota, April 12–13.

The sessions opened April 12 with a buffet supper at which Earl Raymond, Minneapolis District Priorities Office, was the speaker.

The program arrangements for the special contractor session on April 13 were made by Wm. A. Ritt, secretary-manager of the Minnesota Electrical Council. Speakers included B. K. Skeels, Bismarck, N. D., president, North Dakota Electrical Contractors Association; and A. H. Kessler, North Central Electrical Industries, Minneapolis, Minn.

FINANCIAL HELP TO SUB-CONTRACTORS

A Bureau of Finance in the Division of Industry Operations has been set up to assist contractors and sub-contractors in solving financial problems which may arise in connection with the handling of war orders. The bureau will take over the functions and personnel of the Financial Section of the Contract Distribution Branch of the WPB Production Division. Bradley Nash, who has been head of this Financial Section since June 1941 is chief of the unit.

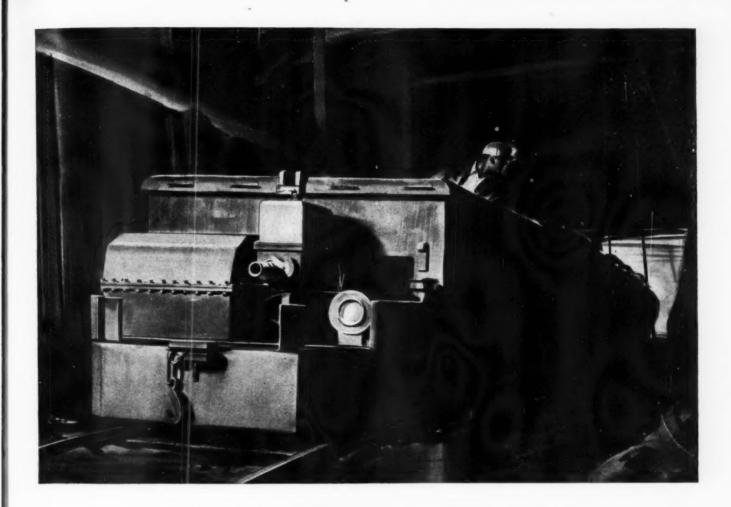
Transfer of the bureau to the Division of Industry Operations will make possible closer contact between the bureau's financial experts and the staffs



MULTI

ELECTRICAL MANUFACTURING CO. 1840 W. 14th St., CHICAGO, ILL.





The "Sandhog Motor" that got a new lease on life

How Electrical Engineers Used Fiberglas* to Combat a Combination of Tough Operating Conditions

A hard-working mining locomotive carried men and materials for construction work in a Hudson River tunnel. Pulling heavy loads with many quick starts and stops subjected the locomotive motor to overloads as high as 30%! In addition, the motor worked in surroundings of mud, moisture, and sand. The tough combination caused insulation failure on an average of every six months. Three years ago, the engineers of an alert electrical service shop re-insulated the motor, skillfully adapting Fiberglas to the job. The locomotive finished the tunnel work without further breakdown ... went on to other work ... and is still operating today with no insulation failure!

THE "SANDHOG MOTOR" that got a new lease on life is one of many instances where electrical engineers have employed Fiberglas to help meet the damaging combination of heavy overloads and adverse surroundings.

This and similar combinations of severe working conditions are more urgent problems than ever before.

For today nearly all electrical operating equipment is contributing to the war effort. It is the vital source of power turning industry's wheels in the war "speed-up." And this power must not fail, even though the demanded output far exceeds that for which the equipment was originally designed.

So-keeping equipment from failing and slowing up vital war production is one of the major responsibilities of electrical engineers.

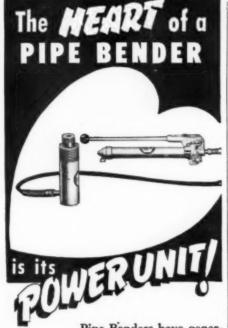
And wherever the combination of severe operating conditions and heavy overloads threaten to cause failures and downtime, forward-looking engineers are giving attention to Fiberglas as their electrical insulation. They are finding that Fiberglas, well-applied and combined with the proper impregnants, gives a *higher* margin of safety with fewer breakdowns resulting from insulation failure.

If overloads and other tough working conditions are presenting you with a double-barreled combination of motor problems, remember Fiberglas electrical insulation. Consult your electrical manufacturer or service repair shop. Or write us: Owens-Corning Fiberglas Corporation, Toledo. Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.

*T. M. Reg. U. S. Pat. Off.

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Pipe Benders have generally depended on hydraulic power from self-contained, "one-purpose" jacks that work only in limited positions. Blackhawk Benders are different—they have Porto-Power Hydraulic Units—hence, operation at any angle, light weight and extra utility. These same Porto-Power Units are widely used in many fields and are the only perfected equipment of their kind! Blackhawk is a specialist in building hydraulic equipment—and Porto-Powers are famous for their dependability, performance and freedom from



Blackhawk Pipe Benders bend rigid conduit and pipe up to 4" diameter smoothly and without kinking. Save need for elbows, couplings, cutting and threading. Portable — lightweight — can be carried or rolled to the job and operated by one man to speed up construction and changeovers.

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	BLACKHAWK MFG. COMPANY Dept. P2052, Milwaukee, Wis.
	Send Full Information on your Pipe Benders.
	Name
ı	Company
	Address

In the Hews

[FROM PAGE 114]

of the industry branches in the Division, with special reference to financial problems involved in converting civilian industries to war work.

The Bureau of Finance does not make any loans or dispense any funds to contractors, but furnishes advice and assistance about financial matters to companies engaged in war production or desirous of obtaining war contracts or sub-contracts. It also endeavors to be helpful in working out the financial requirements when a group undertakes to form a pool of facilities for war work.

The Bureau of Finance now has about 35 representatives located in WPB field offices to establish direct contact with companies which need financial advice and assistance. The staff has recently been handling about 500 new cases a month involving amounts running from as little as one thousand dollars up into millions.

The bureau endeavors wherever possible to arrange financing of war work through commercial banks, and is frequently able to obtain commercial loans for war contractors or potential contractors by advising them on consolidation of outstanding obligations or by demonstrating that their war contracts constitute a sound basis for making a loan. When the required financial assistance cannot be arranged through a commercial bank, the Bureau of Finance assists the contractor to make the proper application to the Reconstruction Finance Corporation, a Federal Reserve bank or other government financing agency.

The bureau has been devoting particular attention to the problem of helping small firms put themselves in satisfactory financial shape so that they can submit bids for sub-contracts.

In this work, the bureau will maintain close contact with the industry branches of the War Production Board to determine the financial needs of industries which are or may be engaged in war work. The recommendations of the industry branches will be given particular weight when financial assistance is requested for expansion or improvement of production facilities.

Financial advice and assistance are provided by the bureau for companies which have difficulty in obtaining sufficient working capital to handle war contracts as well as for those which need to expand or alter their production facilities.

The new Bureau of Finance has developed from the Financial Section of the National Defense Advisory Com-

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Conduit 3/8"—21/2"
Cable to 21/8" (with Bushings)

Cadmium and Everdur
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Sizes from .250" O.D. Tubing to 11/4" conduit.

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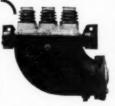
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One of many varied types of Rusgreen Endulators . . . for use with steel or fibre conduit. D.C. service or non-ferrous metal.

Rusgreen Bus Supports
. . . made for indoor
or outdoor service. All
types and constructions.

For more than a quarter of a century, RUSGREEN has specialized in the manufacture of standard and special electrical items for heavy industrial applications. All are built to the most exacting requirements . . . assurance that they'll do the job. Write for a complete selection of RUSGREEN bulletins.



ENDULATORS (POTHEADS) ALL SIZES • ALL SHAPES • ALL VOLTAGES • ALL TYPES • BUS SUPPORTS • SPLICING KITS AND MATERIALS • INSULATING COMPOUNDS

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mission, which was first set up in the summer of 1940. Bureau officials meet regularly with representatives from the office of the Under Secretary of War. Under Secretary of Navy, Federal Loan Administrator and other Federal agencies to consider the more difficult financial problems of companies handling war work. Through these contracts and through its trained personnel, the bureau is able to offer financial counsel which would not otherwise be available to smaller manufacturers throughout the United States whose facilities can be used for war production. The function of the bureau, being purely advisory, does not in any way conflict with the loan operations of commercial banks or Government lending agencies, but the bureau is frequently able to help arrange loans which companies needing financial assistance would not be able to obtain without expert advice.

SCHAEFFER HEADS ST. LOUIS GROUP

Carl I. Schaeffer was elected president of the St. Louis Chapter, N.E.C.A. at a recent meeting of that organization. The other officers chosen include S. C. Sachs, vice-president; Ed Mueller, treasurer and C. H. Christine, secretary.

The directors of the organization are A. H. Loepker, Paul Wendt, E. L. Markland, Fred Rick, A. J. Dunbar and Charles P. Bobe, Russell E. Vierheller was re-appointed business manager of the group.

ESTIMATING COURSE EXTENDED

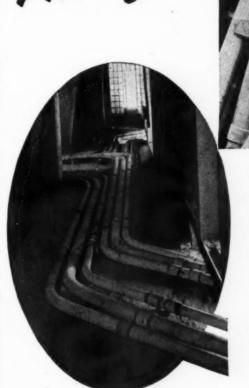
Members of the Cook County Electrical Contractors Association, Chicago, have entered their second semester of estimating classes. They came in on the home stretch of the first 10-week course on March 26.

There was so much interest in the work that a majority of the "students" asked to have it extended, even though it meant that each one continuing his studies had to dig down for an additional \$10 tuition fee. So on April 2, the first session of the 10-week advanced course was held at the classroom of the Chicago Lighting Institute. This time, however, only one class a week is being held and the enrollment is limited to the first 45 who sent in their paid-up registrations.

Instructor Ralph Decker's advanced class is three hours in length and is divided into three parts; one hour for take-off; one hour for write-up of take-off data and one hour for the discussion and application of labor units to the esti-

TIME-SAVING FEATURES OF J-M TRANSITE DUCTS -- NO. 2

Complete
Line of
Fittings!



NO SPECIALS NEEDED for complicated installations of Transite Ducts. Even unskilled crews can finish lines quickly and easily.

THE wide variety of standard fittings available for Transite Ducts permits maximum flexibility in running lines. Curved segments, deflection couplings and sweeps are also included to facilitate changes in direction.

These features, plus Transite's light weight, long lengths and simple assembly mean rapid installation on every job. Once installed, Transite Ducts keep maintenance costs low. Made of asbestos and cement, they are incombustible, rotproof, highly resistant to corrosion.

For details, write for brochure DS-410. Johns-Manville, 22 East 40th Street, New York, N. Y.

Johns-Manville TRANSITE DUCTS

TRANSITE CONDUIT... for exposed work and for installation underground without concrete encasement.

TRANSITE KORDUCT... for installation in concrete. Thinner-walled, lower-priced, otherwise identical with Transite Conduit.



PARAGON AUTOMATIC TIMERS are being used in 63 ways—and more—in manufacturing and plant maintenance to save time and boost total production. For instance, in such jobs as plastic molding, rubber curing, heat treating, enamel baking, liquid agitation, light exposure, pump operation, conveyor operation, watchman signals, power disconnect, and innumerable other operations.

Every Paragon unit is precisionbuilt, simple, accurate, rugged, reliable, modern, and reasonably priced. Made by an organization of designers and engineers, growing since 1905.

WRITE FOR THIS BOOK

A complete catalog describing industrial timers, time switches and other time control devices. Contains illustrations, construction and installation data, list prices and valuable reference information. Sent without cost or obligation. To avoid delays, please furnish with timer orders a preference rating of A-10 or better.

PARAGON ELECTRIC CO. 401 So. Dearborn St., Chicago, Ill.





TEROM PAGE 117

mates studied. The three hour sessions is not new to the boys, for before half of the original course was under foot, they voluntarily requested the two hour class be lengthened an additional hour.

Much of the enthusiasm for this course is due to the type of material presented, the way it is taught and the fact that the members are practicing what they learn. Many of them are using the new method of systematic take-off and job analyses; are applying proper overhead charges, and a reasonable profit; are getting jobs on this basis and coming out on top. So, instead of being purely a theoretical discussion, the course is developing estimators who are discovering that the principles learned in the classroom, when applied to their actual jobs, are bearing fruit.

K. C. RED SEAL HITS TOP

Kansas City, Mo., has reached an alltime high for 16 years of operation of the Red Seal Plan. There were 176 Certified Red Seal Adequately Wired Homes for February, topping the previous record of 102 for September of last year. The average number of electrical outlets for these homes is 60.

The record is all the more significant when you consider that exactly 90 percent of these homes are in the low-price (under \$6,000) class. B. T. Schecher is making certain that Kansas City homes will not lack electrical adequacy.

UTILITY SERVICE RATINGS RAISED

The War Production Board has issued a complete revision of Preference Rating Order P-46 which was issued last September to assist utilities in obtaining the minimum amount of materials necessary for maintenance, repair and operation including service runs and extensions to industrial plants and residences. That order assigned a blanket preference rating of A-10 to such materials.

The recent order supersedes the original order and all amendments thereto and makes several important changes, the principal of which are:

1. The blanket rating of A-10 in the original order is replaced by two higher



UNIVERSAL PARALLEL TAP CONNECTOR



For two wires of the same size or two of different sizes.

PRESSURE TYPE CAST CLAMP TERMINAL LUG



Noted for its simplicity, ease of application and adjustment. Full conductivity and a one-piece

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QUALITY * * * will still be our PRINCIPAL PRODUCT

Since 1892 Signal Products have established themselves as the ultimate in Quality and Price. In the years to come Quality will still be the principal product of the Signal plant—each year aiming to make the best product for the price.

SIGNAL ELECTRIC MFG. CO.

Offices in All Principal Cities



An A-2 rating is granted to deratings. liveries of material for maintenance, repair and operating supplies for power plants and pumping plants. An A-5 rating is granted for all other facilities, such as lines, pipes, and substations.

2. The order also assigns a rating of A-5 to deliveries of materials to bring electricity, gas, or water to war plants or other projects bearing a rating of A-5 or better. This does not apply to housing projects. An A-5 rating is also granted to deliveries of materials needed to protect power or water plants against sabotage, such as fencing, tear gas bombs for guards around such plants, etc. These ratings may not be applied without prior authorization from the Director of Industry Operations of WPB.

3. Line extensions to serve a new consumer are restricted to 250 feet. The original order permitted a 1,000-foot extension. Extensions begun prior to March 26, the date of issuance of this order, may

be completed.

Despite this restriction, the power branch of the WPB announced that houses that were wired prior to March 26 or for which the foundations where completed by that date, may be served with electricity provided they are not more than 2,000 feet from an existing line and provided the utility specifies that galvanized steel wire will be used instead of copper.

This policy, which has been concurred in by the steel branch, will also permit extension of service to a number of homes which were already wired when the 1,000 foot extension limit was im-

posed last December 5.

The power branch made it clear, however, that extensions under this policy are not automatically approved, but that authorization must be obtained for each extension over 250 feet.

COMING MEETINGS

National Electrical Contractors Association
—Annual Convention, Bigwin Inn, Lake
of Bays, Ontario, Aug. 31-Sept. 5.

National Electrical Manufacturers Associa-tion—Spring Meeting, The Homestead, Hot Springs, Va., May 10-15.

National Electrical Wholesalers Association—Annual Convention, The Homestead, Hot Springs, Va., May 17-21.

International Association of Electrical Inspectors — Northwestern Section, Portland, Oregon Sept. 14-16. Southwestern Section, Fresno, Cal., Sept. 21-23. Western Section, Book-Cadillac Hotel, Detroit, Mich., Oct. 5-7. Eastern Section, Boston, Mass., Oct. 12-14. Southern Section, Richmond, Va., Oct. 19-21.

APPLIANCE MATERIALS CURTAILED

The War Production Board has ordered manufacturers of electrical appliances to discontinue the use of certain critical materials in the manufacture of a long list of domestic and commercial

All Porcelain WIRING SYSTEMS * USE LESS VITAL MATERIALS * DO JOBS IN LESS TIME * CUT MAINTENANCE



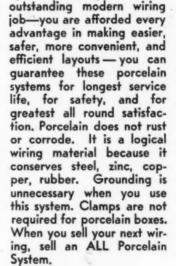
OUTLET BOXES

Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knock-out holes, and mounting screws. High mechanical and electrical efficiency.



SWITCH BOXES

Insure greater safety in wiring and the elimination of all grounding hazards. Made of best quality white porcelain. Metal inserts are placed in two holes of the switch boxes for ruceiving screws of stendard switches, plugs, outlets, etc. Knockouts for single wires, also for cables. Specify and use them.



• An ILLINOIS Porcelain

System enables you to do an



STANDARD TUBES

In sizes ½ to 48 inches, 5/16- to 3-inch diameter in following types: unglazed, glazed, split, floor, split floor, headless, curved end, crossover split, and crossove split, and crossov er. Diameters all uniform both inside and outside.



All porcelain with beveled edge and decorative pattern on face.



CLEATS

Standard one, two





KNOBS



INOIS ELECTRIC PORCELAIN CO. MACOMB, ILLINOIS

PLUGS and On the News RECEPTACLES

Pyle-National plug and receptacle equipment offers a wide selection of styles, sizes and ratings for use with all types of portable equipment, signal and control circuits, pyrometers, extension lights, high frequency tools. welders, battery chargers, and similar equipment. All types are built for heavy duty service, with full bakelite insulation, protected contacts, and heavy steel or cast metal housings.



General Purpose plugs and receptacles: 1, 2, 3, 4, 5 poles, ratings 30, 60, 100, 200 amperes. Round prong contacts, rugged cast metal housings to withstand severe service.



Quelarc circuit breaking types: 2, 3, 4 wire types, ratings up to 200 amperes. Exceptional protection to contacts, for safe use as current rupturing devices.



Triploc and Multiple Circuit plugs and re ceptacles; 1, 2, 3, 4, 6, and 8 pole contact units, allowing assembly in combinations up to 32 ng assembly in combinations up to 32 Manual and automatic release features. poles. Manual and automatic release ...
Ideal for portable tools, pyrometers, signal and control circuits.



Midget Triploc, compact, but with many exclusive heavy duty features for dependable service under severe conditions; 2, 3, 4 pole

Write for your copy of Pylet Catalog 1100 with complete listings of all types.

The Pyle-National Company 1344 N. Kostner Ave. . Chicago, Ill.



IFROM PAGE 1191

electrical appliances commonly found in American homes.

Between March 30 and May 31 these manufacturers, some 200 concerns that normally produced approximately \$60,-000,000 worth of appliances annually were permitted to produce appliances at a rate of approximately one and a half times their rate of production in 1941, but without the use of the critical materials prohibited by the order. After May 31 they must halt production of all appliances except to fill orders or contracts bearing preference ratings higher than A-2. The production of replacement parts is not affected.

The order (L-65) affects such appliances as electric toasters, waffle irons, flat irons, roasters, grills, table stoves, portable heaters, food mixers, juice extractors, percolators, dishwashing equipment, dry shavers, hair dryers, permanent wave equipment, hair clippers, cigar and cigarette lighters, and heating units for new electric ranges, water heaters, and radiating heaters.

Electrical appliances are defined in the order as meaning "any domestic or commercial appliances which have as functional parts electric heating elements of a total rated wattage of not more than 2500 watts, or powered by an electrical vibrator or electrical fractional horsepower motor." The order also applies to heating units of any wattage to be incorporated in electrical appliances or in any new domestic electric range. It does not apply to heating units already in use.

The order specifically states that it does not apply to the following: laundry equipment, vacuum cleaners, refrigerating and air conditioning equipment, commercial dishwashing equipment, fans and electric heating pads, record-players, oil furnaces, vending and gaming machines, and other electrical items not customarily classified as domestic or commercial electrical appliances. For the most part these items are covered by orders previously issued or by orders about to be issued.

The prohibition on materials includes: pig tin, alloy steel, copper or copper base alloy, nickel, or aluminum that was not processed beyond the first stage when the order was issued.

The order contains additional restrictions on the use of electrical resistance material. It requires each manufacturer to: (a) set aside sufficient electrical resistance material to fill all orders bearing an A-10 or higher rating; (b) set aside and hold as reserve for future disposition by WPB 15 per cent by weight of the balance of such mate-

HERWIG

OUTDOOR LIGHTING FIXTURES

DEFENSE PLANTS

DEFENSE HOUSING PROJECTS Also used recently on



No. 520DWA

Aircraft Buildings Cast Iron

Bronze and Aluminum

> When furnished with proper priority Certif.

Specified by and leading architects

Also made in other sizes ESTABLISHED 1908 Send for Complete Catalog

The HERWIG Company

CHICAGO

ILLINOIS

SOLDERLESS CONNECTORS

HAVE YOU TRIED The New Ilsco Lugs?



BUILT FOR OVERLOADS!

The new design—as passed by the Underwriters' Laboratories May 1, 1940.

GENTLEMEN Send me New Catalog and Sample	(G	0	U	1	1
Name	•		_			
Pirm						
Address				**)		
City & State	• •					**
ILSCO COPPER						
AND PRODUCT				I	4	·

rial; (c) set aside, at his option, enough such material to complete appliances permitted under the order; (d) set aside, at his option, a reserve for replacement parts not to exceed one and a half times the amount of such materials he used for replacements in 1940; (e) set aside all remaining electrical resistance material for future disposition by WPB, except that he may sell to other manufacturers such quantities as are needed by them to complete production of their quotas.

HERZBERG TO ...

E. H. Herzberg of Milwaukee has been named Executive Assistant to the President of the National Electrical Contractors Association with headquarters at the Washington office.

For many years, Mr. Herzberg has been Executive Manager of the Milwaukee Chapter, NECA and during the past two years, Chairman of the National Joint Apprenticeship Committee which under his tenure developed the National Apprenticeship Standards for the industry in collaboration with labor leaders and the Federal Committee on Apprenticeship. From his experience in Chapter affairs, as secretary of the Wisconsin Electrical Association and active participation on NECA committees he brings an exceptional background and knowledge to his new duties.

Paul M. Geary of the Washington office has been named Field Supervisor for the IBEW Employers Section in line with the program now under way of expanding the field activities of the Section.



IT'S A GAMBLE decide R. E. Swanby (left), Swanby Electric Co., Washburn, Wis. and L. C. Hackbarth, Merrill Electric Co., Merrill, Wis., as they discuss the chances of the small contractor to survive under priorities restrictions.



BY SELECTING CERTIFIED BALLASTS

Properly designed, constructed and tested Fluorescent Lamp Ballasts are a present day conservation must. Approved Ballasts save on war-valuable materials because they give longer service and also lengthen lamp life by delivering proper starting current and a constant power flow. Then too, Certified Ballasts will give maximum lighting efficiency with lowest power loss.

Save on essential lamp and ballast materials as well as valuable power. Insist that all Fluorescent Ballasts you install bear the three seals that stand for long performance— (UL) for Safety: for Operating Standards: for Quality. Designed for long lamp and ballast life, constructed on automatic equipment for accuracy and constantly tested for close tolerances, Chicago Transformer Certified Ballasts will give you Fluorescent Lighting at its best.

CHICAGO TRANSFORMER

CORPORATION

3501 WEST ADDISON STREET . CHICAGO



You buy only 3 BUSHINGS instead of 3 BOXES-

for all connections

Think of the saving you can make in stock-room space-and conduit fitting inventory!

With these 3 small bushings (interchangeable at any outlet of any Kondu fitting) you can make either a Threaded or Threadless connection, to Thin-Wall or Thick-Wall conduit.



without disturbing conduit

Only with a Kondu fitting can you take out one box and put in another, without disturbing conduit. Every Kondu box is a union in itself.

Find out all about Kondu . . . Quickest to Install, but Vibration-Proof. 100% re-usable. Write for catalog.

KONDU CORPORATION Erie, Pa.



On the Hews

[FROM PAGE 121]

COAST CONTRACTORS HELP SERVICE MEN

Somewhere in the San Francisco Bay region there is a jumping-off place to which the soldiers destined for the Orient and Australia are concentrated before embarkation. Liberty or leaves are denied. There are no bands to play as the boys sail off in this war. Consequently that embarkation point would be a lonely place if the Electrical Contractors' Association of San Francisco, Local IBEW Union No. 6 and other similar organizations had not seen the need for entertainment and recreation and voluntarily provided it. Working through the San Francisco League for Service Men, the San Francisco Contractors' Assn., represented by W. J. Varley and the Local No. 6 represented by Charles Foehn, business agent, installed two moving picture projectors of the latest type, a large screen, sound equipment and amplifiers, as well as other conveniences such as electric heaters and radios.

The Association and the Union likewise cooperated to provide free wiring for a recreation center in San Francisco and plans are under way for a similar one through the joint sponsorship of the Labor Council and Building Trades contractors group.

American Red Cross Chapters in San Francisco have been furnished a volunteer group of contractors and their crews for emergency service in the case of any disaster. A committee under F. O. Sievers, has appointed 16 district chairmen with four assistants in each district who will furnish trucks and equipment to take care of any electrical safety hazards which may result from



IT OPERATES like this, explains P. L. Koehnen (left) Westinghouse Electric & Supply Co., to W. P. Stone, Chief Electrical Inspector of the City of Beloit, Wis. The mechanism is the interior of the latest type of motor control.

BADGER

Synchronous

ELECTRIC TIME SWITCHES



CONTRACTORS LIKE THEM BECAUSE: they are dependable and easy to install USERS LIKE THEM BECAUSE

of economical operation and low cost

of economical operation and low cost
The Badger line of Time Switches is always
in demand by Contractors who want dependability, accuracy, and the right type for a
specific need. They know from experience
that this is the line that gives them successful, profitable installations. They know
when they install Badger Synchronous Electric Time Switches for their customers they
are giving them complete satisfaction—
accurate timing, economical operation, debendable service. You can't go wrong on
Badger. Write for more particulars or see
your Wholesaler.

RELIANCE AUTOMATIC LIGHTING COMPANY

1937 MEAD STREET RACINE, WISCONSIN



ANSWERS INDUSTRIAL HEATING PROBLEMS

Watch efficiency and production soar when you install Thermador Portable Electric Heaters. Enclosed fan forces out comforting warmth or circulates refreshing cooling air. Light, compact, portable, may be moved about plant or office with minimum of effort.

Equipped with four-position switch: cool, half heat, full heat, off. 8 feet of cord and polarity plug. 230 Volts -50 or 60 cycles A.C., Single Phase, Sizes to 5000 Watts. Write for prices and specifications.

HERMADOR SO. RIVERSIDE DRIVE, LOS ANGELES, CALIF. MADISON STREET, OAKLAND, CALIFORNIA

LABORATORIES ENGINEERS REPORT WAR ACTIVITY

Reports on the largest year in the history of the organization, increased war work, and the election of three new directors were the high spots in the annual meeting of Underwriters' Laboratories, Inc. held April 10 in Chicago.

Alvah Small, president, announced that during each month of 1941 the Laboratories services were employed to an extent exceeding that of the corresponding month of any previous year and it is thus demonstrated that the safeguarding of life and property from fires and accidents, to which we have been devoted for nearly fifty years, is a real public service in both normal and emergency times.

Priority control of critical materials has resulted in a steadily increasing stream of proposals for substitutions in the products tested by Underwriters' Laboratories. The safety standards for a large number of products have been revised where necessary, it was said, to permit the recognition of these substitute materials "for the duration only;" but in all cases there is assurance that the safeguarding of equipment is maintained at a high level.

R. B. Shepard, chief electrical engineer, reported a decline of 18 per cent in the work of investigating new electrical products. He said, "This reflects the increased use of electrical manufacturing facilities for war products."

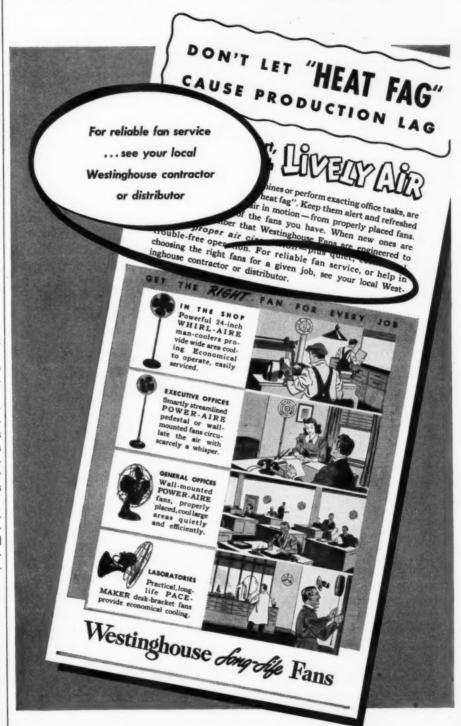
Other work undertaken by the department was the testing of electrically conductive rubber for use as floors and as soles and heels of shoes to determine its value in preventing ignition of flammable vapors or dust by static electricity in shell loading and munitions plants and in hospital operating rooms.

"Work continues," said Mr. A. H. Nuckolls, "on specially designed explosion-proof motors, lighting fixtures, and other electrical equipment for use in haz-



HEARTY "LAFF" comes from Irving Christopher, Belknap Electric Co., Superior, Wis., as Roy W. Springer, Ross Electric Co., Superior winds up a corking good story. Both are enterprising contractors awaiting the shipbuilding boom in Superior.

HOW WESTINGHOUSE HELPS YOU GET MORE FAN SERVICE JOBS



TURN THESE REMINDERS INTO BUSINESS

Contact present fan users in your territory. Sell them on the importance of keeping their fans operating efficiently; also your experience and facilities for rendering reliable service. You'll turn up many leads to profitable sales.

Ads like the above are appearing in Industrial, Restaurant and Hotel Publications.

Contact service prospects in these fields now!

How to design, install, and service fluorescent-lighting systems

Just Out!

A number of actual installations of many types, in factories, drafting rooms, offices, stores, homes, theaters, etc., are pictured in this practical manual, with brief data, to indicate the scope of fluorescent-lighting application and suggest means of meeting specific illuminating problems. Make sure you get the extra profits promised by the growing popularity of fluorescent

lighting. Here is a practical manual covering the subject in all its aspects, presented so that anyone can understand it, with or without much electrical training. Gives the most authoritative information available on construction and performance of all types of fluorescent lamps, principles and methods of calculating illuminating requirements and designing luminaires and installations, pointers and methods of installing and maintaining fluorescent lamps and of locating and remedying their troubles. Includes working data, comparison of cost factors of fluorescent and incandescent lighting, etc.—

everything to aid in the designing, selling, installing, and servicing of efficient and satisfactory fluorescent-lighting systems.

FLUORESCENT LIGHTING MANUAL

By CHARLES L. AMICK Nela Park Engineering Department General Electric Company

312 pages, 6x9, 217 illustrations, many tables. \$3.00

These 10 chapters give you a working knowledge of fluorescent lighting and its application

- 1. The Fluorescent Lamp
- 2. Auxiliary Equipment
- 3. Operating Characteristics
- 4. Installation Hints
- 5. Service Suggestions
- 6. Luminaire Selection
- 7. Fluorescent-lighting Design
- 8. Color Quality
- 9. Fluorescent Applications
- 10. Lighting Economics

Besides giving a how-to-do-it cast to all information presented, the author emphasizes its meaning from the standpoint of answering doubts or questions regarding the value of using fluorescent lighting. From this book both newcomers in the lighting industry and more experienced readers will get an overall picture of every link in the fluorescent lighting chain and an appreciation of the importance of each, as well as instructions in the methods of design, installation, and servicing.

FOR 10 DAYS FREE EXAMINATION

McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York
Send me Amick—Fluorescent Lighting Manual for 10 days' examination on approval. In 10 days I will send \$3.00 plus few cents postage or return book postpaid. (We pay postage if you remit with order.)
Name
Address
City and State
Position
Company EC. 5-42



[FROM PAGE 123]

ardous locations." Much of this electrical equipment is finding its way into munition plants. Although explosion-proof electrical equipment of this type is not specifically designed for use where high explosives are involved, it is nevertheless the safest available type and is

being widely used.

Engineers of the inspection department have also been most active during the year in checking installations of lightning protection systems on several thousand buildings at munitions plants. shell loading factories, and ordnance depots in all parts of the country it was reported. Underwriters' Laboratories inspection of these installations is a part of the contract awarding the installation jobs to lightning protection companies. The Laboratories' consultation on this work has so simplified the specifications for lightning protection systems as to allow the saving of several thousand tons of copper for other war uses.



NEW LIMIT ORDER ON SUPPLIES

Inventories of electrical materials in the hands of distributors, jobbers and Inventory Limitation Order L-63 issued April 6 by the Director of Industry Operations. The new order supersedes M-67 covering electrical plumbing and heating supplies.

Wholesalers and dealers affected by the order who are located in the eastern and central time zones are required to limit their inventories to twice the dollar value of sales of the specified types of supplies which they shipped from stock in the second preceding calendar month. Suppliers located in other time zones may have inventories equal to three times the corresponding amount. Shipments made directly from producers to customers in which the distributor acts only as an agent may not be included as a basis for calculating permissible inventory.

Suppliers whose total inventory at cost is less than \$20,000, and less than \$10,000 for any one of the listed types of supplies, are exempt. Special provision is made for inventories of seasonal supplies.

The types of supplies covered by Order L-63 are:

Automotive, aviation, builders, construction, dairy, electrical, farm, foundry, grain elevator, hardware, health, industrial, plumbing and heating, railroad, refrigeration, restaurant, textile mill, transmission, and welding and cutting

Suppliers affected by the order are required to keep records of their inventory and sales on Form PD-336, and to keep this form in their files for at least two years. Separate records must be kept for each type of supplies handled by the distributor or dealer.

Inventories of material frozen by the "L" or other orders should be included in the inventory records. The provisions of L-63 do not relieve suppliers from responsibility of compliance with any other applicable order or orders.

Suppliers affected by the new order whose inventories on hand at the time the order was issued exceed the permissible maximum must not receive any deliveries of such supplies until the inventories are reduced below the maximum. However, when inventories are below maximum, suppliers may receive deliveries of minimum commercially procurable quantities, even though such deliveries would raise their inventories above the minimum.

A-5 RATING FOR REMODELING

Remodeling jobs providing additional living accommodations in defense areas have been granted an A-5 priority rating by the War Production Board.

In order P-110, effective immediately, an A-5 preference rating is assigned to deliveries to builders and their subcontractors of materials entering into low cost remodeling projects in areas important to the war effort.

It is limited to projects for which the cost of materials which are on the Defense Housing Critical List does not exceed an average of \$100 per room for each dwelling unit. The scarce materials for each structure cannot cost more than \$800.

Projects must be located in Defense Housing Critical Areas and the material for which a rating is granted is limited to that specified on the Defense Housing Critical List, Owners are not permitted to sell or rent any dwelling unit included in the project at prices higher than those approved on the application. In any case the monthly rental—less certain service charges—cannot exceed \$50 for each dwelling unit and the sales price cannot exceed \$6,000 for each single family accommodation.

Builders apply for rating on Form PD-406 filed with FHA. Copies of PD-406 are available at any local office of the FHA, at any priority office of the BURKE A-C POWER-PAC

OR emergency or stand-by light and power load, this Burke A. C. Power-Pac was designed to take off from a Buda Diesel. The complete Burke unit consists of a 125 K.V.A.-A. C. Generator, 480 Volts at 900 r.p.m.—60 Cycle, 3 phase with 3 K.W.-D.C. Exciter, V-Belt connected. Control panel is part of the unit.

Burke is working day and night to produce first things first in electrical units and requests that you anticipate your requirements several months ahead in order to get equipment when you need it.

A. C. Generators 31 to 1500 K. V. A. A. C. M ot ors 20 to 1500 H. P.

BURKE

ERIE

AC&DC GENERATORS

AC&DC MOTORS

D. C. Generators
1 10 1000 K. W.
D. C. Motors
1 10 1000 H. P.

ELECTRIC CO.

EXCITERS . .
TERMINAL BLOCKS



NERATOR

REFLECTORS OF PROVEN DESIGN

The OAMCO line includes every size, style and type of reflector for industrial and commercial use. Whatever your requirements are, you will find OAMCO reflectors engineered to do the job perfectly—designed for maximum lighting efficiency—manufactured for long years of service. OAMCO reflectors are approved by the Electrical Testing Laboratories and are in accordance with the specifications of the RLM Standards Institute. Send today for our catalog showing the complete OAMCO line.

OVERBAGH & AYRES MFG. CO.

MEMBER OF THE RLM STANDARDS INSTITUTE
411 SOUTH CLINTON STREET . CHICAGO



ON THE FOLLOWING PRODUCTS:

- · CABLE SUPPORTS
- . SPLIT COUPLINGS
- · INSULATED BUSHINGS
- . END FITTINGS . TERMINATING POTHEADS
 - CONNECTORS
 - . EXPANSION FITTINGS
 - . GROUNDING FITTINGS



Good management plus good stocks combine to make this possible. Write, wire or phone your order today.

LECTRICAL MFG. CO. 262 BOND ST. . BROOKLYN, N. Y. REPRESENTATIVES IN PRINCIPAL CITIES

FIND "LOST OUTLETS" THE EASY WAY with this amazing tool . .

THE OUTLET DETECTOR



Here's a sturdy, \$12.00 device with which you may instantly locate the exact position and outline of hidden metal outlet boxes, steel conduit and armored cable. Whether "lost" under plaster, wood, linoleum, thin tile or concrete, the DETECTOR finds them . saves costly wall demolition. DETECTOR emits a high frequency violet spark (when box is detected) from tip of removable steel "MARKER" electrode.

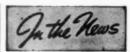
Residential, Commercial and industrial Contract

- Residential, Commercial and Industrial Contractors all need several OUTLET DETECTORS
 Chief Electricians of Institutions and office buildings need a DETECTOR In making wiring changes.
 PRICE IS ONLY \$12.00, postage prepaid. Includes DETECTOR unit with 6-feet of rubber cord. Safety volume control knob. Operates on 110 A.C. only.

Jobbers and manufacturers' representatives— WRITE TODAY FOR DETAILS—ADDRESS DEPT. EC

USE THIS HANDY COUPON

THE LIBERTY 10314 Superior		COMPANY, INC. Cleveland, Ohio
at \$12.00 each (postage prepaid)	OUTLET DETECTORS, rcel- Send for 10- t day trial
Name		****************
Address		
City		State



IFROM PAGE 1251

Bureau of Field Operations of WPB, or at banks, building and loan associations, or other housing institutions. Information regarding the Defense Housing Critical Area List and the Defense Housing Critical List may be obtained at any local officer of the FHA.

Remodeling projects rated under P-110 are exempt from the provision of Conservation Order L-41, issued April 9, 1942, which restricts construction.

WIRE SPECS TO CUT RUBBER USE 37 PER CENT

Specification for the rubber insulation on wires and cables have been set by order of WPB in Amendment 2 to Supplementary Order No. M-15-6-1 restricting the sale and use of rubber. Three grades of insulation are established and only one grade of outer jackets for portable conductors is permitted. The order further requires that compounds used for manufacturing cable tape shall contain no new rubber, not more than 80 per cent of reclaimed or scrap rubber and shall be applied to only one face.

No rubber insulation may be used on the neutral wire of a grounded neutral system. (Recent action of the Article Committee on conductors recommended that slow burning or slow burning weatherproof insulated conductors be permitted for grounded neutral conducters, but did not recommend an uninsulated neutral.)

The specifications were announced as effective April 1st.

CIVILIAN CONSTRUCTION SUSPENDED

On April 9 the War Production Board called a halt to all non-essential construction. The move, in effect, limits new construction activity to projects warranting priority ratings and is a further step in controlling the use of essential materials.

Conservation Order L-41 prohibits the start of unauthorized construction projects. It also places all new publicly and privately financed construction under rigid control, except for certain categories.

The action was taken by the WPB because the war requirements of the United States have created a shortage of materials for war production and con-

SEARCHLIGHT SECTION

(Classified Advertising)

Employment

Business

Equipment

(Used or Resale)

"OPPORTUNITIES"

UNDISPLAYED RATES

15 Cents a Word, Minimum Charge \$3.00. POSI-TIONS WANTED (full or part time salaried em-ployment only), ½ the above rates payable in ad-

Vance.

BOX NUMBERS—Care of publication New York,
Chicago or San Francisco offices count as 10 words.

DISCOUNT OF 10% if full payment is made in
advance for 4 consecutive insertions.

DISPLAYED RATE

INDIVIDUAL SPACES with border rules for prominent display of advertisements. The advertising rate is \$7.50 per linch for all advertising appearing on other than a contract basis, Contract rates quoted on request. AN ADVERTISING INCH is measured %" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by May 21st will appear in the June issue, subject to limitations of space available.

POSITION WANTED

DESIRE SUPERVISORY POSITION with Electrical Contracting or Engineering firm, preferably one doing industrial work. PW-32. Electrical Contracting, 520 N. Michigan Ave., Chicago, Ill.

USED EQUIPMENT

FOR SALE

- 2—MOLONEY TRANSFORMERS 500
 K.V.A. High Voltage 2300. Low
 115-230. Polarity Subtractive 60
 cycle single phase
 1—MOLONEY TRANSFORMER 37½
 K.V.A. High Voltage 2300. Low
 110-220. Polarity aditive
 1—NORTHWESTERN MOTOR GENERATOR set 2 phase—50 H.P. Motor
 —220V 125V—D.C. Generator
 1—HAWTHORNE 50 H.P. 220V Motor—2 phase
 1—WESTERN ELECTRO D.C. GENERATOR—125V
 SWITCHBOARD and circuit breakers
 with generator sets.

 ARCO METALCRAFT. INC.

ARCO METALCRAFT, INC. 395 Brook Avenue, Bronx, New York City

WE BUY AND SELL MOTORS TRANSFORMERS MOTOR GEN. SETS OIL SWITCHES AIR CIRCUIT BREAKERS ELECTRIC EQUIPMENT CO. 347 M. Clinton Ave., Bochester, H.Y. Tol: Main 252 struction. It is in the national interest, the Board stated, that all construction which is not essential, directly or indirectly, to the successful prosecution of the war, and which involves the use of labor, material or equipment urgently needed in the war effort, be deferred for the duration of the emergency.

Many of the same materials, such as iron, steel, and copper, are used by both essential and nonessential construction, and the same materials are largely used for war production. Since there is not enough of these materials for both war production and less essential use, the order, in effect, allocates these materials away from unnecessary construction, and into ships, planes, tanks, guns, war housing, and other essential production.

This step goes much further than the SPAB policy announcement of October 9, 1941. In that announcement, it was made clear that no priority assistance would be given to nonessential construction. In the April 9 order, however, it is provided that no construction may be started without permission.

Equally binding upon property owners, builders, and suppliers, the order prohibits not only the start of construction in most categories, but also withdrawal from inventory and the purchase, sale, or delivery of any material for use in such construction unless expressly

authorized by WPB.

The order specifically provides that no residential construction except for maintenance and repair work may be started without permission oif its estimated cost is \$500 or more. Similarly, no new agricultural construction may be started if the estimated cost is \$1,000 or more for the particular building or project involved. No other construction, including commercial, industrial, recreational, institutional, highway, roadway, subsurface, and utilities construction, whether publicly or privately financed, may be initiated without permission if the cost of the project amounts to \$5,000

Specific types of construction, however, are necessarily exempt from the provisions of the order. These include:

1. Projects which will be property of the Army, Navy, Coast Guard, Maritime Commission and certain other listed agencies of the Federal Government.

2. Projects to reconstruct or restore residential property damaged or destroyed since January 1, 1942, by fire, flood, tornado, earthquake, or the public enemy.

3. Projects of the type restricted or controlled by provisions of the order of the M-68 series, which cover the production and distribution of petroleum.

It was emphasized however, that the order does not affect ordinary maintenance and repair work to return a structure to sound working condition without a change of design.

WHERE TO BUY

Equipment, Materials and Supplies for Electrical Construction — Maintenance — Repairs

DRILLS CONCRETE-METAL-WOOD



WODACK "DO-ALL" ELECTRIC HAMMER AND DRILL

Saves time and money installing expansion anchors. Drills concrete to 11½ " dia; metal to ½". Wo tools in one. Easy to maintain. Universal motor. Write for

Wodack Electric Tool Corporation 4628 W. Huron St. Chicago, III.



ALLEN SODERING SALTS

Soders all metals but alumi-num. Non acid. Convenient powder form. Just add water. Send for samples.

L. B. ALLEN CO., INC.

EST-O-L

Tests Everything Flectrical From 100 to 550 Volts Indispensable to electricians. Equipped with Neon light which tells instantly where trouble lies in electric circuits, fuses, cut-outs, motors, radios, electric appliances; indicates hot or grounded wires; tells A.C. from D.C.



Only TEST-O-LITE, original Neon tester, has exclusive patented safety features. Far superior to clumsy test bulb. Fountain pen size with pocket clip. Useful in homes also.

> List \$1.50 at leading jobbers.

L. S. BRACH

MANUFACTURING CORPORATION
57 Dickerson St., Newark, N. J.

BERYLLIUM COPPER FUSE CLIPS Triple the Grup!



Heat resistant—fatique resistant—high tensile strength. Conductivity greater than phosphor bronze—therefore retains temper longer—assure cooler panels and switches. 8 sizes for fuses to 9/32" dia. Write for Catalog.

LITTELFUSE INC. 4789 Ravenswood Ave., Chicago, Illinois

SERVICE INSULATORS

Wire Holder Insulators in various heights, diameters, and hole sizes . . . cadmium plated screws, leaded. Also double and triple types of House Brackets . . . cadmium plated bolts, cork washers and hot galvanized plates.

SUPERIOR PORCELAIN CO. PARKERSBURG, W. VA



ZENITH REMOTE CONTROL

Instantaneous opening and closing. Ample capacity for heavy loads. Use with time switch and any num-ber MC push switches for remote control. 2 to 4 pole. 30 to 400 amps. Send for complete Zenith

ZENITH ELECTRIC CO.



FRIGID" VENTILATING EQUIPMENT

Circulators, Exhaust Fans, Blowers, Attic and Industrial Fans, Spray Booth Fans, Shutters

See your wholesaler

Circulators and Devices Manufacturing Corp. 100 Prince St. New York, N. Y.

Save Vital Materials With Efficient "Jiffy" Tools!



will cut holes in steel, 34" to 6" in diameter, quickly and easily. Just the thing for emergency repairs.

"Jiffy" SOLDER DIPPER
Saves Valuable Solder on every Job.
-Saves time and labor, too.
WRITE FOR NEW FOLDER!

CLYDE W. LINT

100 SO. JEFFERSON ST.



HEN the "Liberty" ship building program was started, Simplex Shipboard Cables were already favorably known in the industry because of their past performance. The demand for Simplex cables has kept pace with the shipbuilding program and they have been specified for a large majority of the "Liberty" ships now in service and under construction. Simplex Shipboard Cables are doing their part to maintain the "bridge of ships." They will continue to give a good account of themselves until "Liberty" ships become "Victory" ships

Simplex Wire & Cable Co. 79 Sidney St., Cambridge, Mass.



While most Simplex cables are now available only for war work, our bulletins describing insulated wires and cables for various types of service should be in your files for future reference.

CONTROLS
FOR
REFRIGERATION

Not only are all Navy bases equipped with complete fresh meat storage facilities, but refrigerated supply ships keep vessels long at sea stocked with fresh foods. Refrigeration aboard the individual vessels of the fleets enables a diet of fresh meat and vegetables at all times. Yes, our Navy eats well. Furnishing relays and motor controls for this marine refrigeration is but one of the important parts Ward Leonard is playing in providing essential electric controls for the Army, Navy and Air Corps.

WARD LEONARD

Electric control (WL) devices since 1892.

portant parts Ward atial electric controls

ARD since 1492.

WARD LEONARD ELECTRIC COMPANY, 28 South Street, Mount Vernon, New York

In the Hews

[FROM PAGE 127]

Although the order applies only to construction not yet commenced, projects already under construction are being carefully examined by WPB on an individual basis. Such projects may be stopped if the scarce materials to be used in them can be put to more effective use in the war program.

Where priority assistance is granted by WPB, authority to commence construction will be issued by the Director of Industry Operations on appropriate forms of orders in the P series.

These include preference rating orders of the P-14 series, P-19 series, P-41, P-46, P-55, P-98, P-110, and P-115. Preference ratings extended on PD-1 or PD-1A forms or by any other P order than those listed in the L-41 order do not constitute authorization to begin construction.

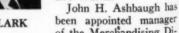
Facilities of the Federal Housing Administration have been made available to WPB in the administration of this order and applications for authority to start construction will be filed with the local offices of the Federal Housing Administration on Forms PD-200 and PD-200A, copies of which may be obtained at any of the district War Production Board offices or at any local office of the Federal Housing Administration. Authority to begin construction will be granted only when the design and specifications conform with the standards established for the minimum use of critical materials and no materials will be used on the projects that do not conform.

-WITH THE - facturers

Westinghouse Changes

B. W. Clark, vice-president in charge of the Westinghouse Electric and Manufacturing Company's merchandising division, was appointed vice-president in charge of sales of the Company. He will

transfer his headquarters from Mansfield, Ohio to Pittsburgh. Mr. Clark succeeds Ralph Kelly, who resigned to become executive vice-president of the Baldwin Locomotive Works.



of the Merchandising Division with headquarters in Mansfield. He was formerly manager of manufacturing and engineering.

Reese Mills has been named assistant manager of the Merchandising Division and T. J. Newcomb as sales manager for merchandise products.

P. Y. Danley has been appointed assistant sales manager of the Westinghouse Merchandising Division and H. F. Hildreth as manager of commercial refrigeration and air conditioning sales. Both men will continue to make their headquarters in the Springfield, Mass., Westinghouse plant.

The Westinghouse Company has announced the organization of a new mainte-nance sales department. Harry R. Meyer has been appointed sales manager of this department, which will coordinate the sale of renewal parts and repairs for the motors and generators.

Westinghouse Supply Elections

At a recent meeting of the board of directors of the Westinghouse Electric Supply Company, Walter Williamson

was elected executive vicepresident. John H. Fisher was elected to the board of directors and appointed general manager.

Mr. Williamson will be in charge of overall administration and Mr. Fisher will direct field operations in the Company's 79 branch offices. WILLIAMSON



Crocker-Wheeler Appointments

Wallace K. Brown has been appointed vice-president in charge of procurement for the Crocker Wheeler Electric Manufacturing Co.

J. B. Colesworthy has been appointed Los Angeles District Sales Representa-



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12

HEADACHES descend upon P. H. Navarro (foreground) purchasing agent of the construction department; and R. A. Miller, of the Commonwealth Electric Co., St. Paul., Minn., electrical contractors. Aspirin belps, they conclude.

Electrical Contracting, May 1942

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★ These companies have included Briefalogs, containing additional buying information on their products, in the 1942 edition of the Electrical Buyers' Reference.



[FROM PAGE 129]

General Electric Company, Nela Park, Cleveland, has promoted M. L. Sloan from assistant manager to manager of the lamp department.

Allen-Bradley Company, has moved their Chicago office to new and larger quarters at 624-630 W. Adams St. John M. Price continues in charge as district manager.



Appliance Repair Schools

Service schools, open to all repair men, were recently held by Westinghouse throughout the Minnesota area. The sessions covered electric appliance repairs and were designed to meet the need of maintaining experienced service men during the emergency, to keep what electric appliances we may have in operating condition.

Schools were held at Hibbing, Duluth, Minneapolis, Mankato, St. Paul, Wilmar and Fargo, North Dakota.

Opens Branch Office

Hatzel & Buehler, Inc., electrical construction engineers, of New York, Wilmington and Detroit announce the opening of a New Jersey office at 988 Broad Street, Newark, New Jersey.

J. A. Beaudry, popular local electrical contractor, who originally came to Newark for this company, will be in charge of their new branch.



BLACKOUT METHODS and procedure are described by Col. M. C. Mapes, Chief, Technical Division, O.C.D., Washington, D. C., at the recent Edison Electric Institute Power Conference in Chicago. He predicted total blackouts only in strategic areas.



MOUNTAIN AREA inspectors discuss the new war time rules at the annual meeting of the Rocky Mountain Chapter IAEI in Denver. Left to right, Marion M. Wilson, Rapid City, South Dakota, new chairman of the Rocky Mountain Chapter; W. J. Alcock, Chicago, Ill., Service Engineer, Underwriters' Laboratories; T. P. Treadwell, chief electrical inspector and fire chief at Fort Collins, Colo.; Victor C. Moulton, re-elected secretary-treasurer of the Chapter and first vice-president of the Western Section, IAEI.

Cedar City Ordinance

An ordinance was recently passed by J. H. Messer, building inspector of Cedar City, Utah, covering inspection, licensing and sales control of electrical equipment.

Close Shop for Duration

Many electrical contractors throughout Minnesota have seen the handwriting on the wall and are closing shop to join hands with others, get into defense construction, ordnance plants, or just retire to a farmer's life.

Here is what some of the boys are doing, according to a report of the Minnesota Electrical Council:

R. J. Newman, Crookston, closed shop after securing a position as inspector on one of the Twin City Ordnance Plant production lines. His entire electrical stock was put up for sale.

A. R. Wells, Mahnomen, Minn., retired from active business for a defense production job at the Minneapolis Moline Plant.

Vern Johnson, Malung, Minn., closed shop last summer and is engaged in defense construction while awaiting the verdict of his draft board.

E. E. Soderquist, Sacred Heart, Minn., said farewell to the contracting business and is now engaged in defense construction at Newfoundland.

F. W. Hirsch, Wabasso, Minn., is now engaged in defense work.

Leo Grosse, St. Cloud, Minn., has closed up shop to take a much needed "breathing spell".

J. Otto Nelson, St. Paul, has retired from business to go into Defense work.

And so, others may follow as the war is prolonged. But there appears to be no serious dislocation since defense work is able to absorb those who have voluntarily closed shop.

NISA Grows

The latest issue of NISA News, official publication of the National Industrial Service Association, carried a list of 24 members admitted during the month of March 1942.

The fact that these new members come from 11 different states indicates that this up and coming motor shop organization is ever on its toes.

Outstanding also was the statement that 20 of the group joined in response to a letter sent out by Bill Wheeler of New York. Bill certainly has plenty on the ball and is in there pitching, always. The results show that.

Minnesota Contractor Dons Uniform

Cliff Lundeen of Dassel, Minn., was the first member of the Minnesota Electrical Council to get into an army uniform in 1942. Cliff squared up all his business affairs before leaving for active military service.

Surplus Drive

The Rocky Mountain Electrical League, Denver, Colorado, started in February to launch a drive for surplus for materials. One drive is for surplus useful materials for sale or exchange among member companies. The other is to assist the WPB in rounding up all available scrap metals. Both efforts are meeting with a good measure of success and hopes are high for additional successes as the drive progresses.

Back to the Farm

Herb Brinkmann of Plato, Minn., has closed out his electrical business and other interests in Plato to go back to the farm. He is planning to venture into large scale farming on his own land at Coffee Creek, Montana.



VETERANS of the A.E.F. in World War I and old timers in the electrical contracting game, John Ellenbecker, Granite City Electric Co., St. Cloud, Minn.; and Eric Nylund, Nylund Electric Co., Duluth, Minn., reminisce over experience in France.

E

New Light on Fluorescent!







Here are typical sections of three fluorescent lamps of the same size, bought from dealers' regular stocks, photographed in their own light and unretouched. One is a Hygrade Lamp; "B" and "C" are lamps of two other manufacturers. Note the smoother, more even coating of the Hygrade Lamp. This is one of the many Hygrade features that insure more light, as well as more attractive appearance.

You may be surprised to learn that the coating texture of a fluorescent lamp is an extremely important factor—not only in appearance, but in lumen output.

And, thanks to unique, pioneering methods of applying fluorescent powders—Hygrade Lamps have a smoother coating than any other kind.

Examine any Hygrade Lamp and you'll see what we mean. Note the myriads of tiny particles that cling to the surface in a smooth, evenly applied film. They provide a coating that's thinner, more attractive—just the right density for maximum illumination.

But better appearance and more light are only part of our story.

Note the excellent color uniformity of Hygrade Lamps — every lamp gives the same color of light.

They remain "bright to the last inch"; end-darkening doesn't dim them before their time.

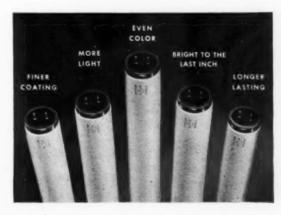
And they last longer—actual service records prove it.

Good vision begins with good lighting. And there's no lighting quite as good as "fluorescent at its finest"—Hygrade Lamps in a Hygrade Miralume fixture—a complete package with lamp, fixture and all accessories working together—with no laggards anywhere, no obstacles to tiptop performance.

It's just the sort of lighting industry wants and needs to-

day, when wartime production schedules call for the utmost speed and precision.

If you haven't yet received our free file-size kit—containing catalogs, prices and complete technical specifications on all Hygrade Fluorescent Lighting Equipment—write today to Dept. EC-5.



HYGRADE SYLVANIA CORPORATION

SALEM, MASS.

Makers of Hygrade Incandescent Lamps, Fluorescent Lamps, Fixtures, Starters, Sockets and Sylvania Radio Tubes

2

More Gossip

Midwest Joint Ventures

Joint venture enterprises are becoming a popular means of handling the electrical construction on large midwest arms plants.

The Associated Electric Construction Company, joint venture group of four leading Chicago contractors, is still in action at the Buick Aviation Engine Division, General Motors Corp.

A large Ordnance Plant in the Indiana area is being wired by Sanborn Electric Co., and Hatfield Electric Co., both of Indianapolis, who have joined hands on this project. Sanborn is doing the engineering and layout; Hatfield the supervision and actual construction.

Veale Electric Co., of Tulsa, Oklahoma and Evans Electric Co. of Kansas City. Mo., are jointly installing the electrical system of a Oklahoma Bomber Plant.

Harry Evans of the Evans Electric Co., Kansas City have tackled another joint venture by going together with Tom Bash, in a newly incorporated company, to do the inside and outside wiring in a Nebraska Ordnance Plant.

And so the progression rolls on—cooperative efforts are evolving new ideas, new methods and efficiencies never before visualized in electrical construction.

Army Instructor

Lieutenant Charles Stephenson, former field secretary and general assistant of the Minnesota Electrical Council, is now on active military service. He is doing a fine job as an instructor at Fort Francis Warren, Cheyenne, Wyoming.



SHOP KINKS occupy the leisure time of Paul G. Winter, Manager, American Electric Co., Indianapolis, Ind., motor repair organization. When not unraveling priorities difficulties, Paul is devising methods of reducing repair costs and increasing the quality of workmanship.

Up School Lighting

The Rocky Mountain Electrical League has successfully established a new high standard of school lighting in Denver. Colorado. Through the collaboration of Field Representative John A. Baker, Denver's two newest school buildings, Montclair Grade and Opportunity School, will excel all others in lighting. There is a strong possibility that eventually these new lighting standards will extend to existing school structures.

On Blackout Committee

A. E. Smiley, electrical contractor, E. E. Coleman and H. E. Scheark, all of Kansas City have been appointed members of the Camouflage and Blackout Committee of the Missouri State Council of Defense. The boys who sold and installed lighting are now studying methods of concealing it from enemy eyes.



SUBSTITUTIONS and inspection problems are discussed by Bill Johnson (left) Duluth electrical contractor and Charles Turner, president, Minnesota State Electrical Inspectors, at the North Central Electrical Convention in Minneapolis.

A Long Trek

Distance means nothing to Albert Bartsch and Dewey Rasche, electrical contractors of Rugby and Bottineau, North Dakota. They have the distinction of traveling farthest (approximately 500 miles) to attend the annual meeting of the North Central Electrical Industries in Minneapolis, Minn.

Expert Editing

What started out as a 78-page document, the revision of the Kansas City, Mo., 1927 City Electric Code, has finally been refined to a 15-page Administrative Code. Now, after feverish months of long, strenuous hearings before all interested groups, the new streamlined code has been turned over to the city for adoption. A fine job of editing has been done.



BUSY PRESIDENT of the Electrical Contractors Assn. of Northern California, T. L. Rosenberg, of Oakland. He runs a large motor shop and electrical contracting establishment serving the industries of the San Francisco bayregion and is doing considerable shipyard work in connection with war production expansion.

Tripp's in Service

Bob Tripp, Son of F. M. Tripp, treasurer, Minnesota Electrical Council, entered military service March 24, 1942. Phil Tripp is one of the boys in the Phillipines who are helping to make one of America's most outstanding and glorious chapters of history.

A-I-J or Better

Motor repair and service men in the Chicago area met recently to study the priorities situation, as it affected their specialized business.

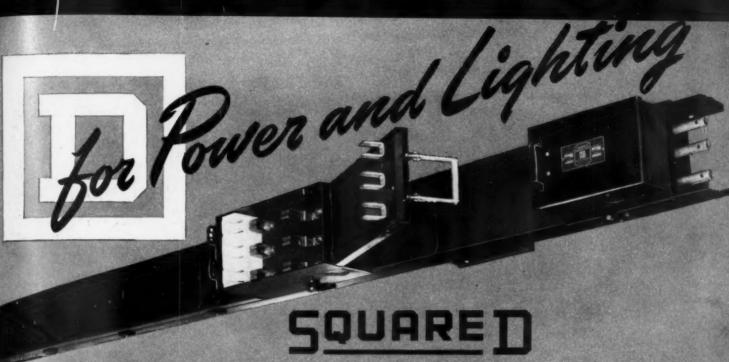
After discussing the wire situation and personal experiences thereto, the group decided that A-1-J would be the lowest priority rating under which they would do work since copper and magnet wire are not available below that rating.

Range Wiring Allowances Cut

The Commonwealth Edison Company of Chicago announced that effective April 30, 1942, their installation and trade-in allowances for electric ranges will be discontinued. Regular allowances will be paid only on ranges sold and reported on or before April 30, provided they are installed by May 31, 1942.

Electric water heaters are not affected by this order and installation and trade-in allowances will be continued on these items.

SEE PAGE 129 FOR ADVERTISERS' INDEX



SAFLEX PLUG-IN DUCT

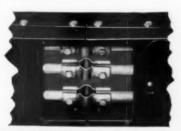
PORCELAIN INSULATORS are of heavy cross-section with surface corrugations to increase electrical spacings.

They are securely mounted every 20" to casings by steel brackets and protected against breakage by shockabsorbing felt pads. Round rigid bus bars are anchored

EXPA

SAFLEX P

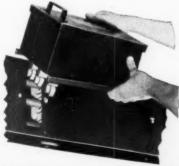
bution n easy to recommend to rec



against endwise movement by

stop-pin at end insulators.

FLEXIBLE COUPLINGS join bus bars. Special design permits expansion or contraction of bus bars to be absorbed at the joint, and also provides flexible connections for correction of minor variations in bus alignment.



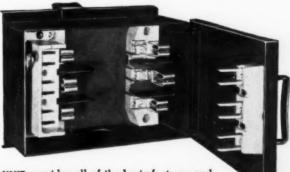
UNITS EASY TO ATTACH. Hook-type bracket on top of plug-in unit attaches to top of duct. Unit is then swung down and jaws snap into position on bus bars. Tightened securely with a single screw—on or off in a jiffy. 12 units may be attached to each 10' section.

EASY TO INSTALL—PERMITS SPEEDY EXPANSION OR REARRANGEMENT

SAFLEX PLUG-IN DUCT provides the kind of electrical distribution needed for today's vital production jobs—makes it easy to revise or expand in the future, on a moment's notice. One hundred per cent salvage value for re-use.

Saflex Duct features round busses. Equal strength in all directions eliminates sagging of conductors between insulators. And round bus rigidity prevents deflection from heavy inrushes of current. 250, 375 and 750 ampere capacity duct utilizes tubular copper busses; 500 and 1000 ampere, solid copper busses. Both types have the same (%") outside diameter. Rigid steel enclosure assures permanent alignment.

Write for complete details of Saflex Duct, the modern answer to maximum flexibility in location and capacity—with minimum loss of time.



SAFLEX PLUG-IN UNIT provides all of the basic features and advantages of Square D's Saflex Panel Unit. Arc shields over live contacts. When cover is open, all exposed current-carrying parts are dead. Positive pressure fuse clips and steel-backed copper contact jaws are used on all sizes. Saflex plug-in units are available in 2 and 3 pole and 3 phase, 4 wire 30 to 200 amperes inclusive, 230 and 575 volts. All units are horsepower rated.

SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

From Maine to California G-E WIRING MATERIALS DISTRIBUTORS Are Eager to Assist You

in Wiring War Projects The bigness of the line G-E Wiring Materials Distributors handle assures suitable materials for wiring new war jobs . . . for rewiring . . . for nor wiring new war jobs ... for rewiring ... for maintenance. These ready-to-help distributors are located at key points all over the country.

local industrial circles for help-

ful co-operation, uses the tele-

phone in helping customers to select wiring materials for plant

conversion and expansion.

Ask about conduit, wire and cable or wiring devices. Your G-E Wiring Materials Distributor has five different conduits, five different types of One is near you. nas nve amerent conduits, nve amerent types of building wire including Type SN synthetic insulated, and hundreds of wiring devices and insulated, and hundreds of wiring devices and insulated. insulated, and nundreds of wiring devices and boxes and fittings. These materials are all made

one manuracturer.
A representative of your G.E. Wiring Materials Distributor will be glad to call. He'll help you by one manufacturer. select materials . . . plan special wiring schedule deliveries ... work on priority requirements. Helpful service



R. T. Lockhart (left) and E. B. Rose, Jr., part owners and salesmen for the Rutkin Electric Co., Asbury Park, N. J., work together to supply fast, helpful service for war industries. Warehouse facilities have been changed to meet present demands better.



A. B. Lakin (right), purchasing agent, and L. A. Coleman, salesman, General Electric Supply Corporation, Washington, D. C., are discussing materials required for new government office building. Conduit and other materials supplied.

tomers in aiding the war effort by

helping them select suitable available materials. Here he is check-

ing stock for a rush shipment with

G. E. Paisley, index operator.



GENERAL % ELECTRIC

